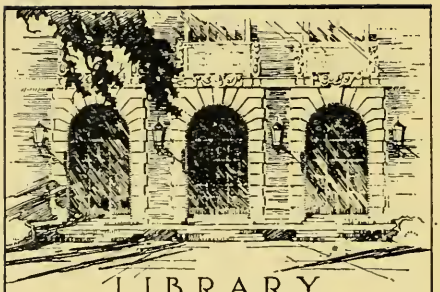

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THE CAHOKIA MOUNDS

PART I

A REPORT OF PROGRESS

BY

WARREN K. MOOREHEAD

PART II

SOME GEOLOGICAL ASPECTS

BY

MORRIS M. LEIGHTON

PRICE $1.50

PUBLISHED BY THE UNIVERSITY OF ILLINOIS
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BY

WARREN K. MOOREHEAD

PART II

THE GEOLOGICAL ASPECTS OF SOME OF THE CAHOKIA (ILLINOIS) MOUNDS

BY

MORRIS M. LEIGHTON

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URBANA, ILLINOIS

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Part I

A REPORT OF PROGRESS ON THE EXPLORATION OF THE CAHOKIA GROUP

BY

Warren K. Moorehead

Curator, Department of Archeology, Phillips Academy, Andover, Mass.
Director, Archeological Survey of the Cahokia Region
for the University of Illinois

INTRODUCTION

In the spring of 1922 and again during the fall of the same year, researches were continued at the Cahokia Mounds. It was due to the Trustees and the President of the University of Illinois that these additional researches were made possible. Two generous appropriations were made by the University. All artifacts and specimens found are in the Museum of Natural History at Urbana, and are on exhibition in the Hall of Ethnology. I desire to express full appreciation of the cooperation and kindness of President David Kinley, Curator Frank C. Baker, Mr. F. W. De Wolf, and Dr. M. M. Leighton. Dr. Leighton made observations upon the geological features of Cahokia and his report appears in Part II.

Continuing the same spirit manifested last year, the owners permitted excavations upon their several properties. In some places large pits were excavated, but for the most part the holes were rather small. Extensive testing was projected in various directions and some damage to crops resulted. In the case of Mound 33—which we called the James Ramey Mound—two acres of wheat were destroyed, and as the pit was left open until fall, the corn crop on that tract could not be planted. Thus four acres of crops were destroyed on this one mound. The general testing of the village site extending over the lands owned by George Merrell, Esq., interfered somewhat with planting, yet Mr. Merrell and his tenants, Mr. Henry Stolle, Mr. Wm. Johnson, and Mr. Louis Recklein, did not object to our work. Mr. F. B. Harding gave consent for us to put down our long testing augers in the Harding mound. I desire to thank the Ramey family for their assistance to the survey and unlimited permissions to explore; also Mr. Merrell and all his tenants. Mrs. Wm. Tippetts, Mr. J. H. Edwards, Mr. Ernest Cole, and others permitted many testings on their lands, and Mr. Rufus Wells and his tenant, Mr. Udell Allen, allowed us to work out large pits in the heavy village site south of the National Highway.

Mr. A. J. Throop and Mr. W. E. Herrington took us on several trips to see sites and owners and rendered the survey assistance, for which we are grateful. Mr. Otto Kruger and Mr. Chas. Jondro allowed series of large pits to be dug in their fields. Judge J. D. Sullivan permitted the men to excavate the two mounds located near his residence at Signal Hill, and the National Stock Yards Company let us excavate on Cahokia Creek in the busiest section of East St. Louis. The survey wishes to thank all these persons.

Thomas H. English, a graduate student in the University of Wisconsin, made researches in the library and furnished additional Cahokia tiles. Hon. W. E. Myer, of Carthage, Tenn., an authority on southern pottery, studied our collections. We appreciate their co-operation.

I am especially indebted to Clinton Cowen, Esq., of Cincinnati, engineer of the survey, and to William J. Seever, Esq., of Webster Groves, Mo., for long and arduous labors in the field. Mr. Cowen redrew the Patrick-Van Court Map, inserted sites omitted by the first surveyors and made our cross-sections. Dr. R. J. Terry of Washington University, St. Louis, undertook a study of the skeletal material; Mr. H. M. Whelpley of St. Louis gave us the benefit of his wide experience in archeological matters; Dr. O. L. Schmidt, President of the Illinois Historical Society, did us many favors. Miss Adele R. Brooks of Monticello Seminary, Godfrey, Illinois, came to the mounds and painted two pictures of the mounds when they were covered by a blanket of brilliant sumac. The principal of Monticello, Miss Congdon, permitted us to study and photograph the Cahokia objects in the Seminary collection. And there were many others who aided us in various ways to whom we express full appreciation.

This report will be confined, chiefly, to a narration of excavations and observations. Yet since the preliminary report is out of print and there is a constant demand for copies, a few of the pages in it are published herein, with some changes.

The plates of specimens in the collection of the Museum of Natural History of the University of Illinois, were made by Mr. A. G. Eldredge, Director of the University Photographic Laboratory. All other photographs, excepting those of the Seever collection, and two by Mr. Gordon Servant, were made by the author.

The numbers following the descriptions of figures on some of the plates indicate the catalog numbers of the Division of Archeology, Museum of Natural History. All of these specimens are on exhibition in the new Hall of Ethnology.

EXPLORATIONS IN THE SPRING OF 1922

The second survey began operations early in March, 1922. During the winter the writer had seen Cahokia again and at the annual meeting of the American Anthropological Association, consulted with other archeologists as to the Cahokia problem. When visiting museums the writer made special efforts to obtain the point of view of field men and investigators as to the best method of procedure in the investigations.

Previous to our arrival, Mr. William J. Seever was authorized to employ men to test lesser elevations, or low mounds, and the area between. He made use of several long, narrow, steel rods from 3½ to 4½ feet in length, and as the ground was very soft at that time of the year, these probes were of great assistance in locating the bones and objects. In case the point of a rod strikes some object the workmen carefully prod all around, get its direction, and size. The soil of the American Bottoms is free from stone and so far as the survey was able to determine all stones—even pebbles—seem to have been brought in by Indians. This view is confirmed by the owners and tenants. For a number of days, the men probed the area lying between Mounds 23 and 43 east and west, and 20 and 62 north and south. Mounds 19, 20, and 21 on the map at the time of the Patricks' visits seem to have been distinct and separate. Now, due to cultivation, the edges overlap. The probes indicated burials in these low mounds, and also on the southern slope of Mound 39, and in Mound 82. The probing was stopped and several trenches were run through the edge of Mound 39, and subsequently a large pit was sunk in the center.

It was thought best to do general prospecting and by this means secure accurate information as to the extent of the village site, and whether there were burials near the surface.

It became necessary to change the working crew from one part of the field to another since large numbers of

visitors came from adjacent towns, and particularly from both St. Louis and East St. Louis. Naturally, the survey did not wish to offend any of these people, yet spectators interfered with research work, and frequently specimens disappeared. It may interest readers to know a little of the plan followed. After working a few days in one spot, and when the "gallery" became too large, the trenches were caved in, and the men moved to some other portion of the field, a mile or more distant. It was generally known when skeletons were discovered, and such finds always brought numerous visitors. On return to their homes, these persons invariably told their friends, and larger numbers would come out to the scene of exploration the next day. Finding no skeletons in sight, and the members of the survey nowhere to be seen, they would naturally conclude that either work was abandoned, or the excavators had moved to some distant point. By this plan we were able to carry on proper reseach.

DESCRIPTIONS OF THE MOUNDS INVESTIGATED

The Sawmill Mound, No. 39

Reference to the large map in the back of this report will indicate that on Rameys' land (northwest from the barn) is Mound No. 39, which is designated by local people as the Sawmill Mound. It is, as near as we could determine without actual survey, 240 feet by 240 feet in extent, a square mound, with level summit. South of it 600 feet is a large oval mound, No. 41, 25 feet high. The original form may have been either pyramidal or oval. No one knows. We think a long, low platform existed between the Sawmill Mound and the one to the south. On the north side of the Sawmill Mound (39) is the old bed of Cahokia Creek, and on that side the mound appears to be 18 or 19 feet high, whereas to the south there is a more gradual slope. To the eye the mound does not appear to be over 7 or 8 feet high when one looks northward. Probably a low mound (82) adjoined it.

The name was given long ago, since sometime between 1850 and 1860 a mill boiler exploded, killing twelve to fifteen men, who were buried in a small mound south of the turnpike, probably Mound 78, or possibly No. 47. This circumstance should be remembered in case some future explorers find well preserved skeletons with traces of wooden coffins about them.

It is not necessary to present a map of the burials along the southern slope of the Sawmill Mound (39). Extending in a somewhat irregular row, or line, for about 30 feet east and west, eight were found, and numbered 4 to 11. The first four of these burials were headed north, the next three south, and No. 11, northeast. Nos. 4, 5, and 6 lay in black soil at a depth of about 30 inches. The surrounding area for a distance of several hundred feet was tested carefully and disturbed ground extended down for a depth of as much as 3 feet, indicating an extensive village

site. Black pottery predominated, and a few red fragments were observed.

Just south of No. 39 is a small mound (82), on the slope of which, down 2 feet, was discovered a small bowl-like mass of hard, burnt clay. Altho broken somewhat, it appeared to be circular in form, about 20 inches in diameter, or 36 inches around the curvature. No complete measurement could be made, yet the rim was well defined. In the cavity, where the base should have been, was a large lump of galena blackened by fire, also some pulverized galena. The lump weighed fully 8 pounds and the powdered galena was about a quart in quantity. There was a pottery bowl, 7 or 8 inches in diameter, and 3 inches high, with this deposit, and a shallow dish very flat, like a plate, of rather thick clay, also an oval stone on which were distinct markings or lines (Pl. II, Fig. 5). There were several ordinary hammer stones, and a small jar, almost crucible like. This is dark brown, well made, stands about 4 inches in height, and the base is unusually thick and heavy. The jar is shown in Fig. 5, Pl. I.

The work continued along the southern slope of Mound 39, and with skeleton No. 9, a young person, was a small toy vessel, about 2 inches in diameter, near the head (Pl. I, Fig. 4). At the right of skeleton No. 8 was a blackened bone object, probably an awl; also an entire deer jaw bone, in the point of which had been cut a groove, thus forming a small chisel or gouge. On the east side of this mound we ran a trench 35 feet in length, and 5 feet deep, but no burials were encountered. A pit was sunk in the center, 14x15 feet. This was dug down 16 feet, then the post augers put down 3½ to 4 feet farther. In the extreme base was found a heavy wet clay. The mound was stratified as follows:—

Mixed earth - - - - 4 feet	Dark streak - - - 3 inches
Dark earth - - - 10 inches	Yellow earth - - - 1 foot
Yellow earth - - - - 2 feet	Mixed earth - - - - 2 feet
Dark streak - - - 4 inches	Dark earth - - - - 3 feet
Yellow earth - - - 18 inches	

The layers in the Sawmill Mound were not even; in the northwest corner they radiated from a cone formation—

dipping to the southeast or east. Yet when we were down about 10 feet they appeared to be more horizontal. On the south side of the trench was a heavy black layer.

Some fragments of pottery (Pl. XI, Fig. 1) also chips and spalls were found scattered throughout the structure. A peculiar clay effigy of a mammal head, an awl cut from the lower jaw of a deer (Pl. IX, Fig. 13), and a rare shell effigy cut from a river mussel, were also found in this mound (see Pl. VII, Figs. 2, 7). The auger borings in the south side of the pit showed heavy blue clay, along with the gray.

While some workmen sank the pit, others continued searching for burials. They found a number of disturbed burials, or rather fragmentary ones, much broken. These were scattered throughout the soil 2½ to 4½ feet in depth and without regularity. Probably Dr. Patrick or Mr. McAdams had dug here, since the soil seemed soft and disturbed. Below all the burials we sank test pits several feet in depth.

Skeleton No. 11 lay extended head northeast (Pl. XIII, Fig. 2). It was quite well preserved. An ordinary jar lay near the right hand, and a bowl near the left knee (Pl. I, Fig. 6). A shell gorget and a bone knife were also found with this skeleton (Pl. VII, Fig. 1; Pl. IX, Fig. 8).

While part of the men were working under the writer's direction, Mr. Seever took a crew and prospected two low mounds west of No. 48. In Mound 80 he ran a trench about 6 feet in width, and 50 in length, finding a large number of potsherds, bones, and burnt clay, and village site material. He also went more than a mile up Canteen Creek and prospected both sides of the stream for a distance of half a mile. The drainage canal system inaugurated by the County Commissioners sometime ago has so changed conditions that it was impossible for him to make further observations. He says, "I find that the old bottom lands of Cahokia and Canteen creeks have been filled in by wash in flood time from 5 to 10 feet, thus obliterating some low mounds that were in existence, and covered up

the deposits mentioned as having been seen by Charles Rau in the '60's."

MOUNDS 19, 20, AND 21

Probing the lesser mounds indicated burials north of Mound 33, and reference to the large map will indicate that there are seven mounds in a line east and west. Three of these, Nos. 19, 20, and 21, are so near together that the edges overlap. This is probably due to cultivation of the soil. The original heights of these structures are unknown, but we assume that No. 20 was the largest. No. 19 is at present about 5 feet in height, 20 about 4 feet, and 21 is about 3 feet in altitude. Most of the burials were in No. 20, or on the slope of it. Skeleton No. 12 was found on the southern slope of No. 19 at a depth of about 3 feet, and was fairly well preserved. The right leg had been much elevated and we found the tibia and femur at least a foot above the rest of the body; yet it had not been disturbed by the plow, and this curious form of burial must have been intentional.

At the head of this skeleton were four pots shown in Pl. XIV, Fig. 1: first the bowl, next the jar, then a dish in which a fine, dipper-like object was placed. This is decorated with sun symbols and has a long, slender, projecting handle. The right arm of the skeleton was in normal position to the elbow, but the ulna and radius lay across the abdomen, and the left leg was bent at the knee. All of this pottery was perfect, but there was nothing else in the grave. (Pl. I, Figs. 1-3). Skeleton 33 was doubled up, the knees being drawn up to the abdomen. There was disturbed earth just east of it, and a detached skull 2 feet north. Numerous test pits showed several fragmentary human skeletons, and much village site debris.

About 150 feet from the west end of our trench, at the depth of 3 feet, were many fragments of spades and hoes, or digging tools of reddish chert. Why these were all broken we do not know. There were enough fragments to comprise 15 or 20 of the tools, and about them were ashes, and burnt earth. Fifteen feet beyond was a mass of pulverized galena lying in ashes.

Our total trench was extended a distance of over 250 feet from the center of Mound 19 well into No. 21. Much village site material occurred through the soil and extended in places as deep as 7 feet. Naturally, the greatest depths at which village site debris occurred were near the highest parts of the mounds. Plate XV, Fig. 2, shows the position of two skeletons. The burial in the foreground had a vessel at the head; the skull rested upon a small sea shell and there were traces of pigment (in small lumps) near the face. Between burials 21 and 22 was found an

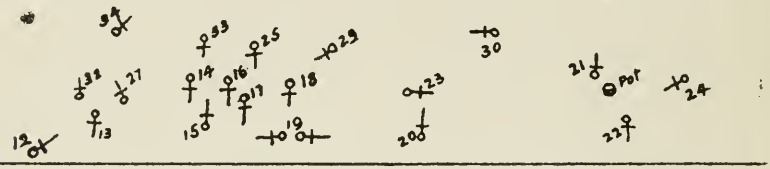

FIG. 1—Position of skeletons in trench cut through mounds 19, 20, 21.

ordinary cooking pot, lying 5 feet from the nearest skeleton. With three or four of the other skeletons we found ordinary clay dishes or bowls usually placed by the head. None of the skeletons were well preserved altho two or three were taken out fairly entire and loaned to Dr. A. J. Terry of the Medical Department of Washington University. It is not necessary to record all the depths of the skeletons; they varied from 2½ feet to 6½ feet, and save one or two were all extended. Eight of them lay with the heads to the north, 3 with the heads to the east, 2 with the heads west, 5 with the heads south, and others northwest and southeast (Text Fig. 1). Whether pottery originally placed by the natives had been removed by McAdams, Patrick, or others, we do not know. It is possible that no pottery was placed with these interments, except such as we recovered. Assuming that such statement is correct, about one-third of the burials were accompanied by vessels or pottery. Two-thirds were without pottery. The exception is with No. 12 which was accompanied by four vessels as has been stated. A fine needle was

found with skeleton No. 30 (Pl. XIII, Fig. 2) and an awl made from the heel of a deer with skeleton No. 18 (Pl. IX, Fig. 10).

Dr. F. S. Smith, of Nevada, Iowa, was present during the removal of these skeletons, and attempted to make some observations on the remains, as they lay in the ground. He made no measurements and his notes are mere field suggestions.

No. 16. Female.

No. 18. Probably female, decayed, and therefore sex uncertain.

No. 20. Young woman 18 to 25 years.

No. 21. Female; pelvis very light, the brim typical form. Antero-posterior diameter about 4½ inches. The iliac crest very thin and the roughened crest for attachment of muscles not well developed. All long bones small and delicate. The femora typical form and meeting of the lower leg at the usual angle for women.

"It is impossible to make any accurate measurements but the thin light bones, and typical size and form of the clavicles all point to the above numbered skeletons as being females."

All the interments appear to be on the same level or base line, and were probably village rather than mound burials. That most of them appear to be women is interesting, as usually both sexes are found in the cemeteries.

THE JAMES RAMEY MOUND, NO. 33

Spring Operations.—It was decided to select a large tumulus and examine as much of it as possible. This structure adjoined a pyramid or "temple mound" and both seemed to occupy a central position in ancient Cahokia times.

There was originally a deep depression between Mounds 33 and 34, so the Rameys informed me, which had been filled in by dragging the earth from the summit of the mound down the steep slopes into this depression. The mound was conical originally, and according to all witnesses probably 15 feet higher than at the time of our exploration. This would give it a height of 38 feet. The adjoining mound to the west, No. 32, is a temple or pyramid structure with flattened summit, and is so shown in the maps and old records. No. 33 was supposed to be a

burial structure, since it came to a "point", and local tradition is persistent in so describing this tumulus.

Testing elsewhere was deferred and fourteen men were put to work on the north side at the lowest slope. We began at a point which appeared to the eye to be 4 or 5 feet above the general surface, yet we had gone down over 7 feet before we found the base line. Our trench extended to the south.

When Professor F. C. Baker of the University of Illinois came to visit our survey, on the 3rd of April, we had run the trench 30 feet south in the mound. The face of the trench, or south wall, was 12 feet high. The width of the pit was 27 feet east and west. A number of marine shells, a few bone awls, and the usual broken pottery and animal bones were found. While Professor Baker was present we sank a number of pits with the post augers and brought up bones from the lower layers or bottom. These bones were observed to be of brownish green color. Later, during the research in this mound, the same peculiarity was observed, and all bones below the 18 foot level were coated and discolored. Chemical analysis will determine the nature of this action, which has seldom been observed in other mounds. On the 7th of April the trench wall, being nearly 15 feet in height, became dangerous and the earth caved in frequently. It was therefore sloped down by the men and four teams were put to work scraping the earth out and depositing it on the slopes to the north and south. Teams and scrapers were continued at work until about the 22nd of April when we again resorted to hand work to complete the trench.

Our total area excavated was about 100 feet north and south, and 35 feet east and west. Some area was lost since it became necessary to slope the walls (23 feet high) to prevent injury to our men. East and west, on top, the opening was about 45 feet—the base line narrower, as stated. In text Fig. 9, Part II, is shown a cross section made by Dr. Leighton. The scale indicates the thickness of the strata.

For some two weeks the men dug until the base line was exposed. On the west side of the trench opposite stakes 110 to 130 were a number of post holes 3 to 5 inches in diameter. The posts had decayed but traces of wood remained. There had been no fire at this point. The holes appeared to be part of a large circular edifice or wigwam, and were found at a depth of about 14 feet from the summit. Lying near one of them was a long double

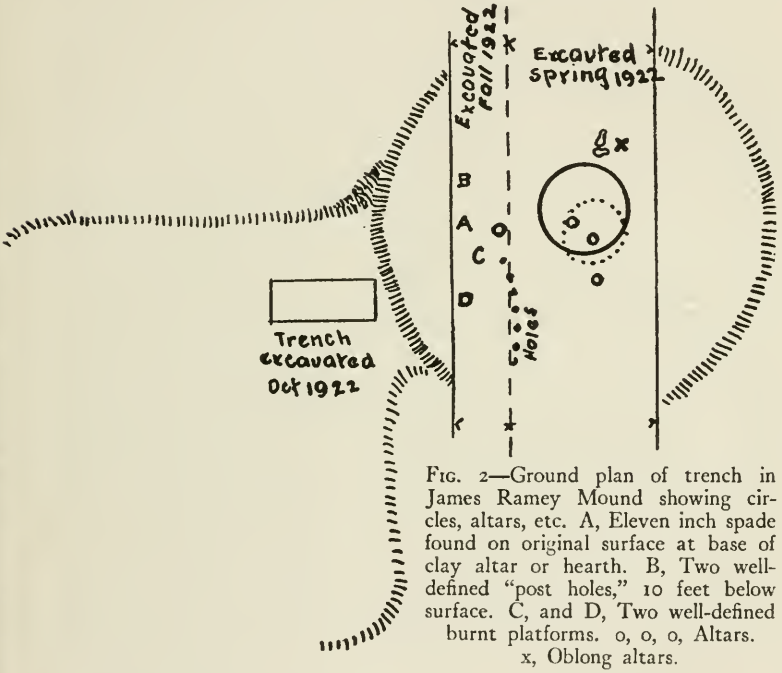

FIG. 2—Ground plan of trench in James Ramey Mound showing circles, altars, etc. A, Eleven inch spade found on original surface at base of clay altar or hearth. B, Two well-defined "post holes," 10 feet below surface. C, and D, Two well-defined burnt platforms. o, o, o, Altars. x, Oblong altars.

pointed flint knife which is shown in Plate X, Fig. 1. In the center of the cut was found the circular trench, and the circular post holes, and the altars or basins shown in text figures 2 and 3. These lay upon the base line about 23 feet from the summit.

Nothing just like these circles and basins have been previously found in mounds so far as the writer is aware. That is, there have been more perfect altars, and post

holes arranged in circular form but not all of them in one place. Pl. XV, Fig. 1 shows the excavation, the circles being in the foreground; Pl. XV, Fig. 3 the two circles and depressions in the distance; and Pl. XIV, Fig. 2 a close view of the depressions or altars and the two circles. As the holes would not show clearly in a negative, corn stalk stubs were inserted to bring into sharper relief the holes. The men carefully hand troweled the entire space for a distance of 25 feet. In the center were two burnt basins or depressions which were filled with ashes.

Mr. Cowen has called them altars in his drawing, and they may be such. They vary from 17 to 26 inches in diameter and the depressions were four to seven inches in depth. They were not burned hard as are the Ohio altars. The one south of the circle contained nothing. North of the circle were two shown near the top in Fig. 2, and these were of different form, rather shallow, and three-fourths circular. Instead of the circle being complete, the depression in one was extended to the east and in the other to the north. When uncovered, they were not unlike crude pans in appearance, the handles being rather short and the cavity in them not as deep as in the main body of the depression.

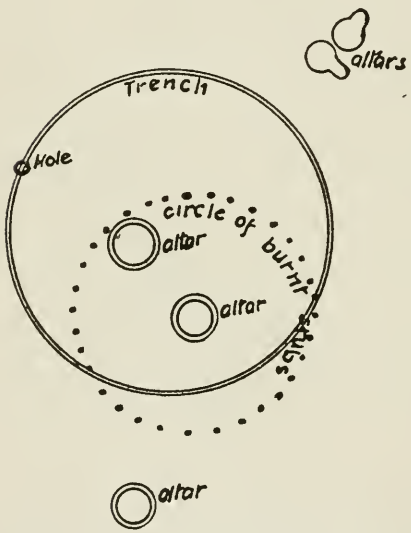

FIG. 3.—Plan of circular trench, altars, etc., in James Ramey Mound.

The trench was about 3 inches wide and 20 feet in diameter. It was nearly a true circle (Text Fig. 3). To form it the Indians dug out the earth to a depth of several inches and then filled it with dark soil so that the contrast was unmistakable. There was nothing in this trench—

not even ashes or charcoal. From the center of the sun symbol and extending south was a circle of post holes 2 to 3 inches in diameter. Probably saplings had been inserted and then the primitive wigwam burned, as there were great quantities of charred stubs and charcoal. In the center of this wigwam circle was a burnt basin and to the north-west lay another. Ashes from these two depressions were taken by Mr. Alfred C. Carr and analyzed for Mr. V. C. Turner of the Scullin Steel Company by Mr. L. Z. Slater.

"I enclose herewith complete qualitative and quantitative analysis of the samples you gave me. You will note there is a large quantity of silica. We could not account for this until the specimens were examined under a microscope and then it was found that small quantities of clay or sand had been washed down into and between the fibres of the specimens. It was impossible to take these off and therefore we have assumed that the silica was the particles which adhered to the fibre, together with part of the iron and alumina. The phosphoric acid, calcium carbonate, and magnesium carbonate, together with some of the alumina led us to assume that specimen must have been bone at one time, at least it could not have been wood-ash or charcoal.

"There was also another interesting discovery and that is that under fire test there is a trace of lithium. This leads us to believe that there was tobacco present among the bones and clay, as this lithium is always present in tobacco and it is hardly possible that it would be in any other substance that was placed in the receptacle where the samples were found."

V. C. TURNER

"Following is the analysis of sample taken from James Ramey Mound:—

Silica (Si)	62.10
Iron and alumina (Ir & Al) mostly oil 203	25.15
Phosphoric acid (P_2O_5)	.49
Calcium carbonate ($CaCO_3$)	10.55
Magnesium carbonate ($MgCO_3$)	1.66
	99.95

Fire test shows trace of Lithium."

L. Z. SLATER

Through an area of 25 feet, having as a center the altars, was a floor not very hard burnt, and yet beyond question a level surface on which fires had been built.

Sections of gas pipe were screwed together and with these the men were able to test to a depth of 15 or 20 feet with the augers. They thoroly tested the mound to the east and south of these circles. It was then thought that possibly there might be burials in the structure and that the altars and sun symbols occupied the center portion of the mound area. However, no burials could be discovered.

The various artifacts found during the course of exploration were kept in cigar boxes according to the levels at which they occurred. There was no particular difference in material to be noted except, possibly, the best pottery—that is the red ware and the sherds indicating thin, well made vessels—was found from 15 to 20 feet below the surface. Near the bottom there appeared to be more village site material, and at about 10 feet from the summit the preponderance of fragments indicating ordinary cooking vessels. Types of pottery fragments are shown on Plates V and VI.

Numerous photographs were taken at various stages of the work. About the 1st of May the walls were thrown in, and with the consent of the owners the mound was abandoned until fall. When we left, the excavation had the appearance of a crater about 100 feet in length, 60 feet in width, and 12 feet deep in the center.

September-October Operations.—On arrival at the James Ramey Mound in the fall of 1922, altho but four months had elapsed since the abandonment of the work in the spring, we noted that vegetation had sprung up in the depression. Visitors had attempted to dig, but fortunately we had left the mound in such shape that they could do no damage.

It was decided to work toward the west and extend the trench in that direction. Text figure 11 presents the total work done on the mound. When we completed operations the latter part of October, the total area excavated was 120 feet north and south and about 55 feet east and west. As

the Temple Mound, No. 32, adjoined this structure, a deep pit was sunk to the bottom of that mound. The pit was about 25 feet from the western edge of our trench and was 14x8 feet in diameter at the bottom. This is shown in Fig. 2. While the teams lowered the mound to the bottom, the men sank the pit mentioned, and found the base line down about 17 feet. It was not thought necessary to excavate the space between the west wall of No. 33 and this pit, altho the augers were put down at many points. The usual village site debris extended clear to the bottom, but on the base line was a very heavy deposit of dark soil and ashes a few inches in thickness and here we observed much more village site material than in the other mound. It would appear that the Temple Mound was erected over a site occupied by a wigwam, for the mound was built directly on this part of the village site and none of the refuse had been cleaned up. Some thirty 7-inch auger holes were put to the bottom of No. 32, and decayed bones, burnt earth, etc., were found at several points. It might be advisable to trench this mound at some future time.

On October 12th but one team was retained and a party of sixteen men dug out the remainder of Mound 33 by hand. Another of these burnt basins was found near stake 130. This was about 20 inches in diameter and about 5 or 6 inches deep and was filled with charcoal. The west side of our trench, being somewhat beyond the center of the mound, was not over 19 feet in height. Stratification was not as well marked as observed last spring. There was a good deal of gumbo in the west wall and it was not necessary to slope the bank very much. A thin layer of pure sand about half an inch in thickness, which we had traced continuously from the north side of the old trench, extended in the mound but seemed to disappear a little south of the center.

The large post holes observed last spring in the west side of our trench did not continue regularly. Several more were observed but there was no special regularity and we therefore concluded that they did not represent a circular dwelling.

During the course of sinking the trench, part of a human femur some 6 inches in length, a vertebra, and two teeth were found, but there were no burials. Near stake 120, at a depth of 17 feet, was found a large flint spade about a foot in length. This is shown in Fig. 5, on Plate X. Nothing very important was found during the course of exploration save that a heavy layer of charcoal, in which was bark, extended to the south and south-west between stakes 130 and 140. When we ceased operations this layer continued in the walls, but as we had already spent a great deal of money on this mound the pit was not enlarged.

There was an even, burnt floor, and covered by a thin layer of white ash and above that large pieces of charcoal and charred wood. We estimated this layer to be some 3 feet above the base of the mound. At several points on the burnt floor were small, flat stones, irregularly shaped and apparently limestone, which had been subjected to heat. There were also many calcareous clay concretions. This platform or burnt floor with accompanying ashes and charcoal, we hand trowelled for a distance of nearly 20 feet. It still continued in the wall of our trench toward the southwest when we ceased work.

Conclusions on James Ramey Mound.—The circles have been called sun symbols, tho they may not be such, but that is our opinion. What led the Indians to construct such a mound, we do not know. It is often difficult for us to appreciate the aboriginal point of view. That certain ceremonies were here enacted we may believe, but the nature of these still remains a mystery.

A few notable objects found in the James Ramey Mound are shown on the plates. Two clay discs on Pl. XI, Figs 2, 4. Peculiar pottery designs on Pl. VII, Figs. 8, 9. Two bird head effigies on same plate, Figs. 5, 6. Two good bone awls on Pl. IX, Figs. 3, 7. A peculiarly cut foot bone of wapiti or American elk is shown in Fig. 12, on Pl. IX. A very finely-cut and decorated gorget shell of the spike river mussel *(Elliptio dilatatus)*, with evenly notched edges, probably used as a nose or ear ornament,

is shown in Fig. 3, on Pl. VII. It was found at a depth of 20 feet, near stake 110. Broken projectile points and arrow heads are figured at 1, 6-8, 11, on Pl. XII. Marine mollusks, beads, and ornaments are shown on Pl. VIII. Most of the Cahokia beads are flat and not cylindrical.

THE JONDRO MOUND, No. 83

This was not put on the map which we inserted in our previous report (Vol. 19, No. 35, University of Illinois publications). In fact, Patrick, Van Court, and the other surveyors seem to have left out a number of small mounds. It lies nearly a mile and a half west of Monks, and is almost circular, being 140 ft. x 130 ft. A diagram is shown of it in Text Fig. 4. The surface is rather irregular and we

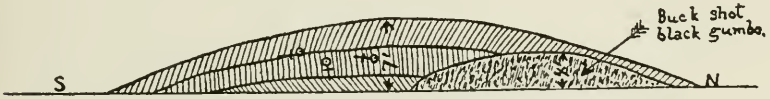

FIG. 4—Diagram of Tusant Jondro Mound. Sec. 34, Twp. Edgemont, St. Clair Co. Position of burials is indicated, the first burial being 75 feet from north edge of mound.

supposed originally the mound was conical and that it had been worked down during cultivation in the field, but the owner, Mr. Tusant Jondro, informs us that while his father had a garden on one side and he set out an orchard, the eastern half had never been cultivated. Therefore the structure, which now varies from four to six feet in elevation, could not have been much higher than at present. It might have served a double purpose, that is, for burials and later as an elevation on which wigwams were set.

Mr. Wm. J. Seever had charge of the work, and spent some time running a trench north and south through the entire mound, and another trench from the south end of the mound, northwest for 20 feet. He found twenty-four burials, and enough detached burials, or rather bodies so decayed that only a portion of skeletons were observed, to account for sixteen or seventeen more. In the north half of the mound there are probably many more burials. Mr. Jondro states that his father uncovered burials during the

operations incident to tree planting or gardening. The cross section in Fig. 4 shows that at the north end there was an original mound 4 feet high, composed of buckshot gumbo. This was extremely hard digging, and nothing was found

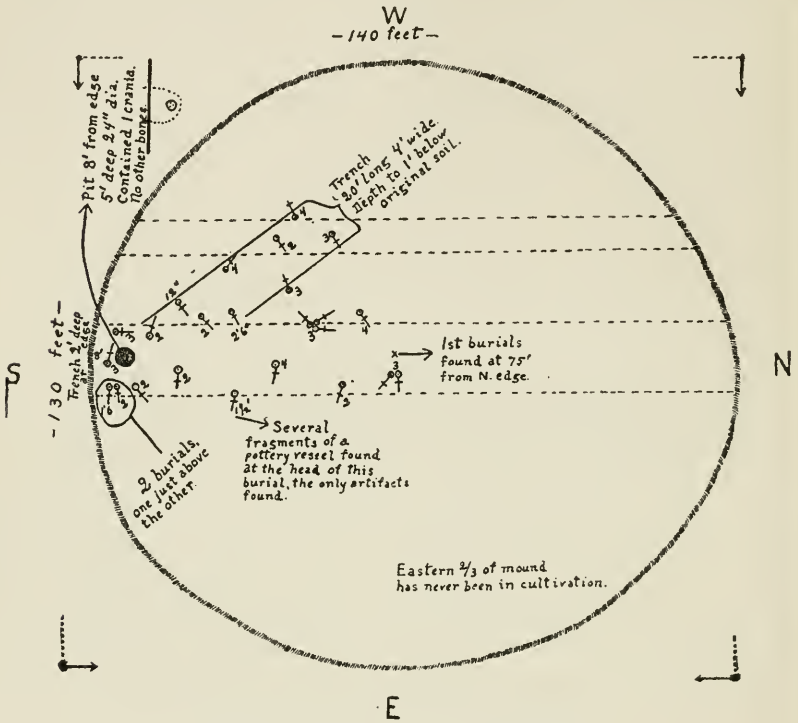

FIG. 5—Field plan of the Jondro Mound.

therein. In fact, in our excavations, survey members never found burials or much village site debris in gumbo soil, except the Chucallo Mound and this was not all gumbo.

The skeletons were headed in various directions, and no uniformity as to points of the compass was observed by the Indians. Excepting one skeleton noted on the map, no objects accompanied any of the burials (Text Fig. 5). Not enough pottery fragments were found with this burial to enable restoration. Every skeleton was badly decayed; in many instances it was impossible to remove even one-third of a femur or tibia.

About 200 feet north of the mound is a sunken depression from which earth and gumbo were taken for this mound; a similar one lies 175 feet south of the mound.

SAM CHUCALLO MOUND

This is the last of the several tumuli in the corporate limits of East St. Louis and is not on the original map. It lies on the edge of a deep depression where the earth has been removed by the Pennsylvania Railway to make a filling. Cahokia Creek is 100 yards to the north. The distance from Sam's Mound to Monks Mound is something over 3 miles. The Pennsylvania excavation removed the western edge of the mound, up to where it was about 4 feet in height. The owner did not wish a large group of men to be put to work so he and another man were employed to dig a trench some 70 feet in length, 10 feet deep, and 8 feet in width (March-April, 1922). The mound was of very heavy gumbo, and unpromising. Very little village site material occurred save now and then a hammer stone and animal bones. A large flint spade was taken from the 7 foot level, somewhat east of the center of the mound. At the 9 foot level, near the center, Sam discovered a skeleton surrounded by a dome shaped mass of very black gumbo. The soil on either side and above this mass was somewhat lighter. Dr. M. M. Leighton of the University of Illinois was present when part of this skeleton was uncovered. After Dr. Leighton departed, the workmen uncovered 7 other skeletons lying on a little burnt bench about a foot above the bottom of the mound, or 9 feet from the surface. This find was made just west of the skeleton mentioned. Above the burials one could clearly observe a small mound of tough gumbo perhaps 4 feet in height. Apparently the burials were covered by this, and the rest of the mound added afterwards. A brick building (the residence of the owner) to the south somewhat disturbed the southern edge of the mound. In making the street a little of the east edge was removed, and the trolley tracks are flanked by a low bank on the north side of the mound. It is, therefore, difficult to give accurate meas-

urements but we judge the mound to have been about 150 by 120 feet in diameter.

The seven skeletons referred to were bunched burials, all crushed by the heavy gumbo and many of the bones powdered so that they appeared like sawdust. This form of decay had not previously been observed, and several boxes full of disintegrated bones were taken for preservation. There were no objects with the burials. Undermining the bank to the south brought into view the feet of two more skeletons—better preserved and not bunched burials. Altho badly broken, as stated, the bones seemed unusually heavy. However, the owner did not wish explorations continued, and we were compelled to suspend work. We hope to complete work on this mound at some future time.

PITTSBURG LAKE CEMETERY

On the shores of Pittsburg Lake, about 6 miles southeast of Cahokia, a large cemetery was discovered when a new automobile road, known as the Louisiana Boulevard, was constructed a few years ago. Mr. H. Braun was present when the teams and scrapers at work on the boulevard uncovered the remains. He states there were 30 or 40 burials and he secured some 51 pottery vessels.

To ascertain whether this cemetery was of the Cahokia culture, we visited the site, paid the owner for two acres of wheat and began testing. We found a total of 13 skeletons in a space some 20 by 25 feet. With them were 11 pottery vessels, 6 of which were whole. The cemetery was thoroly trenched by us for several days, 6 workmen being employed, but we could discover no other interments.

The skeletons (save one) were badly decayed, due to the character of the soil, and most of them were near the surface. Our field notes are as follows:

Skeleton 38. Head south. Extended. Depth 3 ft.

Skeleton 39. Bowl, set with rim upwards.

Skeleton 40. Two pots. A detached skull. 3 awls were laid across a wide dish. Head south. Dish against the jar 2 inches from jar. One foot from surface. Well preserved. Body extended on back. Bone arrow point on face.

Skeleton 40. Depth 3 ft. Head east, and badly crushed.

Skeleton 41. Skeleton south. Decayed and broken, 24 ins. from surface.

Skeleton 42. Red pot with decayed skeleton. Pot in dish. Effigy head broken off. Some red paint. 20 in. down.

Skeleton 43. Small pot by head of a child. Very badly decayed. 18 in. down.

Skeleton 44. Young person, 2 pots. Head north. Badly decayed. Down 18 in.

Skeleton 46. 5 feet deep. Legs drawn up. 2 photos. No objects.

In several instances, near the head of the body was a large flat stone set in the grave. There were several of these, and they were smaller than the stone slabs forming the well known box graves of the middle South. Mr. Braun stated that this peculiarity was observed in many of the burials destroyed by the road construction crew. All pottery found was typical of the middle South, and did not exhibit any of the Cahokia decorations. A bone awl found with skeleton No. 39 is figured at 4 on Pl. IX.

MOUNDS 14 AND 84

Except the Kunnemann Mound, none lying north of Cahokia Creek had been examined by us. Therefore, in April, we trenched two of them.

NUMBER 14.—The field notes state, "About one-third mile north of Monks is a mound lying between old Cahokia and the present drainage canal. Years ago a road through the swamp passed along the crest of this structure. There is a sunken depression in the center of this mound from end to end. Dimensions, north and south 180 feet, east and west 110 feet. About 5 feet high. Composed of heavy gumbo. Very hard digging. Put 8 men to work. Sunk 10 pits each 4 feet deep; also used post augers for 3½ feet. A few pieces of stone, no pottery; some broken bones."

MACKIE MOUND, No. 84.—This is about 1¼ miles west of Monks Mound and is on the bank of old Cahokia Creek. It is covered by a heavy oak grove, has never been plowed, and is about 130 feet north and south and 10 feet high. It is surrounded on three sides by a swamp and

there is a long low platform, or apron, extending about 150 feet to the east. This platform varies from 3 to 5 feet high. A trench was extended a distance of about 30 feet in the mound down to within a few feet of the base line, then the post augers brought into service. Numbers of pits were sunk 3 or 4 feet in depth. With the exception of a few scales of flint or chert and one pottery fragment, absolutely nothing was found. The mound was composed of the hardest kind of buckshot gumbo, with no sign of stratification. It is clear that no village existed at the point from whence the earth was taken to build this mound, as there are no broken artifacts to be observed in the soil.

SULLIVAN'S MOUNDS

Persons frequently called our attention to two mounds on Signal Hill. These command a view of the American Bottoms and in an air line are some four miles south of the largest tumulus—Monks. We secured permission to excavate from Judge J. D. Sullivan, both structures being in his yard. The largest one when viewed and measured from its base, is a low conical mound, 10 feet in height, some 90 feet in diameter, nearly circular at the base line, very symmetrical in the contour line, not differing, when viewed from the slope on which it is erected, from similar ones in the Cahokia Mound region (Text Fig. 6). Excavations of a trench some 6 feet wide through the east and west axis, carried down to and below its base, revealed, however, a very unusual mound construction or building. Instead of beginning upon the original surface and upbuilding from there, as they usually did, the builders of this tumulus reversed the procedure, by excavating a bowl-like depression apparently the diameter or size of the structure afterwards to be erected. This excavation, rather uneven on the floor line, a few inches in depth at its outer edges, increasing in depth until at or near the center, it attained a maximum depth of 18 inches. Into this bowl-like depression, numerous oval and circular pits were dug, in depth from 2 or 3 to 18 inches; in diameter from 12 inches, to the largest encountered, of 5 feet 2 inches. Nine

of these pits were located in the floor of the trench (with traces of others on outer sides of the trench); these were thoroly "cleaned out", and accompanied clearly definite strata of white or gray ashes, mixed with charcoal, in very dark and loose loamy soil, numerous pieces of broken pottery or earthenware, some animal and bird bones, quantities of small irregular broken stones showing discoloration from heat, one battered and broken grooved granite axe, several defective celts, hammer stones, and unio shells mingled with the dark colored earth of the pits.

From one pit were taken two highly specialized bone implements some 4 in. long (Pl. IX, Figs. 5, 6). From

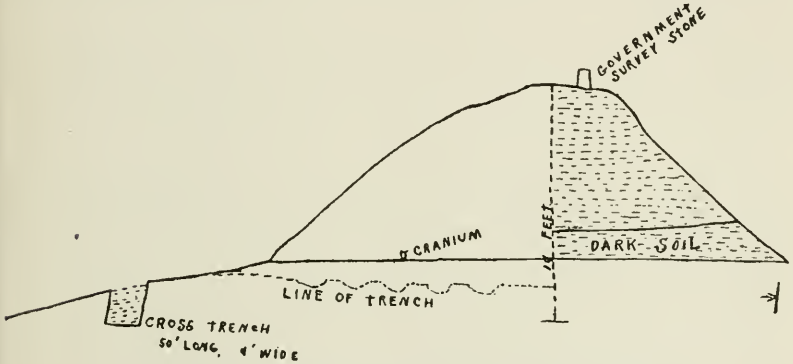

FIG. 6—Mound on bluffs east of East St. Louis, on Judge Sullivan's land. Excavated Oct. 5, 6, 9, 10, 1922.

another, two perforated bone beads, and from another a fragment of quartz crystal, and a small specimen of worked hematite.

Apparently, the entire floor or bowl-like depression of this structure contains similar pits or depressions, since edges of others were noted in the trench.

The loess formation, of which these uplands largely consist, being of an almost bright yellow color, the least discoloration or excavation therein, and subsequent filling in of foreign material is instantly and plainly discernable and easily followed.

Seemingly these pits had been used either as hearth, or for purposes of cremation. Then the bowl-like depression

was filled in with a dark soil or earth to the original surface and on top of this the mound was erected, the latter being a mixture of light and dark colored earths.

Directly east of this mound some 250 feet was a smaller tumulus removed some years since during the erection of a residence. Numerous pottery fragments were taken therefrom, and an entire pot or vase; it could not be ascertained if there were any human remains.

THE KRUGER BONE BANK

At the point marked burial and village site on the map near the lower left hand corner, is a long low ridge flanking a depression in which, in former times, there was considerable water. Old residents state that before the present drainage system was inaugurated, there were many fish in this depression, and that it was connected with the pond to the east.

Along the sandy ridge burials had been made by Indians, and both Mr. Kruger and the owner who preceded him had dug up skeletons. He permitted excavations and about a dozen men sank test pits here for two days. None of the burials were more than 3 feet in depth, and most of them within 20 inches of the surface. There were fragmentary skeletons indicating disturbances. Doctor James Terry of Washington University took one or two of the best ones to the medical school for observation. The rest were left in the ground. We did not excavate the entire area as the burials were accompanied by no objects and did not appear to be of special importance. Some 16 bodies were found.

It is well to remark in passing that these scattered burials and little cemeteries are found throughout the entire Cahokia area.

THE HARDING MOUND, No. 66

This is one of the finest mounds of the entire group. It is about 550 feet in length, and at the base line about 125 feet north and south. It stands out very prominently, and appears to the eye at least 40 feet in height, altho it may

be less. At several points pits were dug by hand to a depth of 12 to 17 feet. In the bottoms of these pits the augers were put down to a depth of 22 feet. That is as far as it is possible to test with the augers. Seven inch cores were obtained from these testings, and studied. The mound appears to be stratified, but there was little village site debris to be found at the different levels.

Our auger testing was rather unsatisfactory, and we were not able to determine whether the mound contained interments. On a structure so long and narrow, it does not seem possible that wigwams would be placed. In the event of its use for house sites, the dwellings would be of restricted diameter, and placed in a long row. Such arrangement is unusual in Indian villages.

This mound has never been cultivated and is well preserved. Explorations by means of tunnels have been suggested. Such a procedure would not injure the contour, and its character could thus be determined if a tunnel were extended through the long diameter, and in addition several cross section tunnels at various points. This structure is one of the same form as the Powell Mound, but of shorter base. Like the Powell Mound its long axis lies east and west, and that similarity has given rise to various conjectures on the part of observers.

MRS. TIPPETTS' MOUND, NO. 61

This is an oval mound located between the two ponds on land owned by Mrs. William Tippetts. Externally it is rather promising, and as it is shaped not unlike altar mounds of the Ohio Valley, the survey decided to test it. Much to our surprise we found it composed of exceedingly heavy, black gumbo. Two pits were sunk and by means of the augers we tested to the base, a distance of 20 feet. Very little in the way of material was encountered. The mound appeared to be unstratified. The ground was so hard it required the united efforts of six strong workmen to put down six auger holes in three days time. The

structure is placed on the "reserved list" for future exploration. Gumbo can be more easily excavated in February or March, as after winter rains and snow it is soft.

THE MITCHELL MOUNDS

Several observers, who have visited the Cahokia region in past years, have included the group of mounds at Mitchell Station under the general descriptions applying to Cahokia. Whether these mounds are culturely a part of Cahokia itself can be determined by exploration. Since copper and other forms similar to finds made in the Ohio mounds and along the Illinois river were discovered at the time the Chicago and Alton Railroad cut through one of the mounds (about 1871), it is suggested that the Mitchell group of mounds may have been erected by another tribe. In the Illinois valley itself platform or monitor pipes, copper ear bobs, and copper hatchets and plates have been found, and the mouth of the Illinois river is not more than thirty-five miles from the Cahokia group. It should be remembered that these observations are based on specimens in private or public collections secured during the course of superficial explorations on the part of workers who left us neither field notes nor photographs.

Owners of the Mitchell mounds have given consent for exploration of one or two of the structures next March, and the survey looks forward with anticipation to this work. After its completion we will be able to determine the relationship of the builders of the Mitchell group to those of Cahokia.

Dr. J. F. Snyder of Virginia, Illinois, in his various papers (see bibliography) has given us some light on prehistoric Indian occupation of the State. Granting full credit to Dr. Snyder and all others, one is justified in the assertion that we know little concerning aboriginal inhabitants of the great State. Inspection of the many collections seems to indicate that we have at least three, and possibly four, tribes or cultures of stone age times, yet nothing definite can be ascertained until thoro explorations and studies are undertaken. Beyond question Illi-

nois offers one of the most attractive fields in the United States for research work. Its primitive people may have been affected by contact with, or knowledge of, the Plains Tribes. The relationship between bands of Indians living in the northern part of the state along the lake to those of the Illinois valley; whether the Indians living along the Wabash are of the same stock as those from the Illinois River region, and the lake front; or the cultural status of those occupying the extreme southern portion of Illinois—all these and many other questions are of the greatest importance and one is free to affirm that our present reliable information is so meager that we are unable to formulate even preliminary observations.

The Collinsville-Edgemont Bluffs

Flanking the east side of the American Bottoms are the high bluffs frequently referred to. McAdams, Patrick, and others seem to have secured most of their better specimen (pipes, bicaves, and long chipped objects) from graves, small mounds, or sites on these promontories. Local collectors affirm that the entire range of high-land flanking the river from Alton to Cairo is one vast, ancient cemetery. Mr. E. W. Payne, whose agents have collected extensively in that region, estimate that thousands of various implements, ornaments, and utensils have here been gathered. Skeletons are plowed up every spring and fall. A thoro investigation of the remains on these bluffs should be made at some future time.

VILLAGE SITE OBSERVATIONS

On our large map are several areas marked "Village Site." Readers should not conclude that wigwams existed merely at those places. Such markings indicate that at certain points we dug pits and found the indications of occupation extended several feet into the ground. We believe that all the area was occupied except a space south of the National road. This is bounded on the west by tumuli 68 and 70, on the south by 66 and 65, on the east by 64 and 62, and on the north by 77. We did not test very extensively in this area but where we did so, little was found.

The land lying west of Sand Prairie Road belongs to George Merrell, Esq., and for nearly half a mile, until Mr. Recklein's property is reached, is leased by Mr. Stolle. Throughout this land, from 1500 to 2500 feet west of Monks Mound, we found indications of a heavily populated village. Varying from 12 inches to 4 feet in depths, the soil was disturbed, and the usual pottery fragments, bones of animals, ashes, unio shells, hammer stones, spalls, etc., were present. The Stolle land was tested in October. We then examined properties to the south, owned by Mrs. Tippetts, Mr. Wells, and Mr. Cole. Beyond Stolle's land, to the west of the Recklein land, the Village Site continued for more than a quarter of a mile, and is said to extend through the property owned by Mrs. Thomas. She was one of the very few persons in the Cahokia region who would not permit us to excavate. Her workmen, however, said that pottery vessels and bones were dug up when they sank post holes. We have proved, by continued testing, that the village extended from over a third of a mile northeast of Monks Mound to the edge of Mrs. Thomas' land, all of which parallels Cahokia Creek. This is a total extent of over a mile and a half. Just how far north of Cahokia Creek the village existed, we do not know, but we presume about a quarter of a mile.

THE WELLS'-TIPPETTS' VILLAGE SITE

The tests on the Ramey heirs' lands, so far as village sites are concerned, were completed last year. Plates II, IV, V, VI, IX, and XI illustrate different artifacts from the Ramey Village Site. Fig. 6 on Pl. 5 is decidedly Algonquin. Numbers of specimens containing this decoration were found. When our pottery collection is larger we may be able to shed some light on the mingling of forms and designs, a few of which do not appear to be southern.

This fall, the survey did not sink additional pits, but on Mrs. Tippetts' estate, south of Monks, and on the adjoining property owned by Mr. Cole, and Mr. Wells, much work was done. Mr. Allen had leased land of Mr. Wells and he permitted us to work extensively with 8 or 10 men on an area lying 100 to 200 yards south of Mound 51. Here the village debris was as heavy as at any point on the Ramey lands. There were several low mounds (74, 75, and 55). In No. 75 much burnt clay was discovered, also lumps in which were impressions of reeds and sticks,—doubtless the walls of dwellings.

Stone celts, bone awls, arrow points, and beads were found in the Wells site. Some of these are figured on Plates II, IV, VII, IX, XI, XII, and XVI. On Pl. X, a shouldered hoe and two spades from field southwest of Monks Mound, are figured (Figs. 2-4).

THE STOCK YARDS SITE

In the Smithsonian Report for 1866 (pp. 346-350), Dr. Charles Rau presents the first description of pottery from the Cahokia region. His observations were quoted in our preliminary report[1] and need not be repeated here.

We visited lower Cahokia Creek, and found it very difficult to conduct field operations. In Rau's time, East St. Louis was a small place, and the stock yards not extensive. Today, the buildings, pens, tracks, streets, etc., comprising that great industry, must cover at least 500 acres. We were able to discover but one open tract, and

[1] *University of Illinois Bulletin*, Volume 19. No. 35. pp. 25-27.

that bordered Cahokia Creek, and was at the end of a short thorofare called Bogard Street, and some 300 yards west of St. Clair Avenue. Here was an acre and a half of land upon which no buildings had been erected. The creek bank is some 12 or 15 feet in height. The place had been used as a city dump, and it was necessary to remove debris before original surface was reached. We could not identify the clay bank to which Rau referred, but did find thick pottery, and one or two sections of bowls which appeared to be unfinished. A piece of pottery with peculiar design, resembling in outline a large beetle or water bug, is shown on Pl. XI, Fig. 3.

Observations were rather unsatisfactory. In 1866 the creek water was clear; there were unio shells present; also one could walk along the foot of the bank for a considerable distance. Rau had no trouble in locating the clay deposit from which the women secured material for pottery making. Much of the creek bed is filled with sewage, waste, chemicals from the factories and stock yards, and the bank is now sloping.

Probably at the time of his observations he was able to select the best section for study. We assume that this was up the creek from where we worked. It is proposed next year to send two men from Monks Mound westward along either bank of Cahokia Creek, and test all places not yet covered by buildings. The old bed east of the corporate limits of East St. Louis is now filled with vegetation. Probably as late as 1875, work could have been satisfactorily carried on along the creek, for a distance of about 4 miles; now most traces of Indian occupation have been obliterated.

We see no reason to doubt that the entire southern bank of Cahokia was occupied by the ancient people. From the fartherest eastern extent of the village site, down Cahokia Creek to the Stock-yards site is about six miles.

In last spring's report we estimated the territory covered by cabins or wigwams to be 1000 acres. How far back from the creek, both north and south, habitations

extended, we do not know, but we assume variations in width due to the configuration of the site, ponds, etc., interfering. Actual testing proves above 1,000 acres of occupation. If the creek bank was inhabited through the present site of East St. Louis, the total should be given at 2000 and possibly 2500 acres.

The extent of the prehistoric village located at the great group of stone ruins in New Mexico, known as the Chaco, has not been stated. So far as the writer's observations extend, he neither knows of, nor has read concerning any village equal in extent to that at Cahokia. And the more we excavate, the more area we include in our estimates.

TESTING THE BOTTOMS OF THE PONDS

The presence of chipped objects and pottery fragments in the muck in the several ponds surrounding the Cahokia Group gave rise to the suggestion that possibly (but not probably) the Indians built houses on piles over the water. Four men were put to work in October testing the bottom of two or three of these depressions. A dredging apparatus similar to oyster tongs was made, and the workmen lowered the tongs from a flat bottomed boat, and continued dredging for about two days. Where the water was shallow, they waded and made use of an ordinary garden rake. The result of the test was not satisfactory. The bottom is rather smooth, not irregular, and slippery. While numbers of artifacts were brought up, the tongs slipped over others. Our work was not completed but we came to the conclusion that there is not sufficient material to indicate that Indians had built dwellings over the water, and furthermore, in a dry season such as last Fall, there would not be sufficient water to afford protection. Two of the large depressions were dry, and the survey was able to test them with augers and shovels. Little material was secured.

The Ramey brothers claim that when they were boys, two of these ponds contained water throughout the year, were deeper, and such fish as crappie, bass, and buffalo were taken frequently. A more careful search, extending

over a greater length of time, might give different results, but at the present writing, we are of the opinion that artifacts were either lost or thrown in the ponds by the Indians.

PREVIOUS WORK AND COLLECTIONS RELATING TO THE CAHOKIA GROUP

Dr. Patrick

Dr. A. J. R. Patrick, Belleville, Illinois, was one of the pioneers in Cahokia work. The survey called on his widow, who is now Mrs. John Bauman. She showed us some field notes written by Dr. Patrick, in 1877. November 18, of that year, he visited Monks Mound, and did some exploring in the vicinity. Again, on April 7, 1878, April 6, 1879, and May 11 and 12, 1879, Dr. Patrick dug in numbers of places along Cahokia Creek, and in the low mounds. His observations, for the most part, were confined to burials, within 4 feet of the surface, since he used a slender, steel rod, by means of which he sounded for bones, pottery, or stone. This method of testing has been employed for many years by collectors, and others, and is possible when soil is free from stone. The rods will not penetrate hard gumbo, but in the late winter, or early spring, the rods penetrate easily to a depth of 4 feet. One is able to distinguish by feeling with these rods stone from pottery, bone or decayed wood from layers or sections of hard earth. The use of the rod in the Mississippi Valley burial places, (where the soil is favorable) has been so extensive that a large percentage of all burials near the surface have been reached. Most of the large collections of pottery vessels were secured in the manner described.

Dr. Patrick, in the field notes, states that in a small mound east of Monks, he found a floor of clay. In the center there was a depression, or basin. On the slopes of mounds and in one or two low mounds he found some effigy pottery, portraying frog, deer, bear, fish, and duck, but unfortunately, he does not give us the numbers and we cannot identify the mounds he explored. In one of his notes, he does not think the large mounds were used for burial places. He suggests the theory that they were made in order that dwellings might be elevated above the plain. He considered the ponds as artificial. On April 6, 1879, he

found a skeleton and pottery, also a skull, which he calls No. 3, accompanied by a copper plate. Mrs. John Bauman says this plate was sent to the Smithsonian Institution. A letter from Dr. Neil M. Judd, Curator of Archeology, informs the writer that he cannot locate the copper specimen in the Smithsonian collections.

Mrs. Bauman has in her possession several field maps, and a profile survey of the group. She says that the first survey was executed Nov. 5, 1876, and that the profile survey was made July 5, 1879, and that Louis Gainer Kahn, a surveyor, either made this survey, or assisted on it. She thinks there were several surveys, more or less thoro, made of the Cahokia mounds in the period between 1870 and 1888.

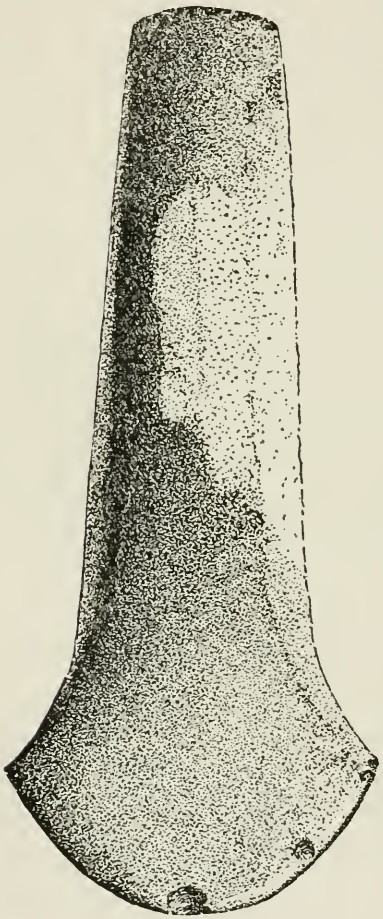

FIG. 7—Large polished celt or hatchet in Peabody Museum. Half natural size.

SPECIMENS FROM CAHOKIA

After considerable investigation we were able to trace the location of a number of Cahokia objects. Most of these were found many years ago and the exact circumstances of discovery are not available. The interesting local collection on exhibition in the museum of Monticello Seminary, Godfrey, Illinois, was made by William McAdams probably 25 to as far back as 40 years ago. Some of the objects in this collection appear to have been in the hands of other owners for some time.

The largest private collection of material from Indiana, Illinois, Kentucky, and Missouri is that owned by E. W. Paine of Springfield, Illinois. Mr. Payne has many objects from mounds, graves, and the surface of the Cahokia district and a radius of 10 miles about it. His collection is packed away and it is impossible to secure photographs or descriptions.

In the Peabody Museum is a large polished celt, or hatchet. This is shown in Text Fig. 7. This was chipped from very fine, highly colored flint—dark brown and yellow, with a suggestion of pink in the coloring. The specimen was then carefully ground and polished until all depressions made by flaking were removed. Mr. Charles C. Willoughby, Director, called my attention to this specimen. The catalog stated that it was secured from Monks Mound about 1873. This was six years prior to Professor Putnam's visit to the mounds.

Fig. 8, Plate XVI, shows a very large axe 12x17 inches, weight 17 pounds. It was found near the Kunnemann Mound. There is a low mound just west of the Kunnemann, No. 12, from which a large number of large unfinished celts have been secured. Mr. Seever obtained a number of these for the Missouri Historical Society collection years ago. The small hematite axe (Pl. XVI, Fig. 7) was also found near the Kunnemann Mound, on the surface.

Plate XVII, Figs. 1-5 show five pipes, three of which are effigies. No. 1 is a large frog effigy pipe from a grave on the bluffs east of Cahokia. No. 2 is a human effigy pipe found near Cahokia. No. 5 is a pipe of sandstone, from the region, exact locality not given. No. 3, a clay pipe from a grave near Cahokia. No. 4 is probably a bird effigy, altho the workmanship is not very good.

Plate XVII, Fig. 8 is a sandstone effigy pipe, large. Shown ⅓ size. Found with a burial in the cemetery on the bluffs between the two sugar loaf mounds, known as Group 3, Madison County, Illinois. William J. Seever collection.

Plate XVII, Figs. 6, 7, show two stone idols from the Monticello Seminary collection. Number 7 is of fluorspar

and about 12 inches high. It was found on the bluffs directly east of Cahokia. Number 6 is of red material, almost pipestone, is about 18 inches high, exceedingly well made and came from a small mound, one of the Cahokia Group, on the Caseyville Road, St. Clair County, Illinois. Unfortunately the number of the mound is not given.

Plate XVIII. Two sea shells and a string of shell beads. The string of shell beads (Fig. 1) and the shell vessel (Fig. 2) were taken from the Mitchell Mound at the time it was destroyed by the Chicago and Alton R. R. in the winter of 1876. The shell (Fig. 3) shown for comparison, was found in a mound in Jersey County. They are shown ¼ size.

Plate XVI, Figs. 2-6. Shell spoons and bone awls (Fig. 1) from cemeteries south and west of Cahokia. Collection of William J. Seever. Broken unio shells with scalloped edges have frequently been found by the survey and were identical with those shown in this picture.

Plate XVIII, Fig. 4. Attention is called to this remarkable art-object. It portrays the height of efficiency in flint-chipping. Found by Mr. Barth, a tenant of the Rameys, south of Monks Mound, in December, 1921, on the surface. Shown full size.

OBSERVATIONS ON THE SEASON'S WORK

Comparison of the map presented in this bulletin with that published in our preliminary paper (Vol. XIX, No. 35) will indicate that we have added many more mounds, the last one being No. 84. We have also included burial places and such areas of village site as were excavated. In addition to these 84 mounds there is one lying in the edge of East St. Louis, those of East St. Louis which were destroyed, mounds south of East St. Louis, those about Horseshoe Lake, and Mitchell. Including these, together with the mounds on the bluffs in the vicinity of Edgemont and Collinsville, there must have been a grand total of at least 125 mounds within 10 miles of the dominant structure known as Monks. At some future time all of these will be mapped and then we shall know the exact number.

The work of the past two seasons would indicate that some of the mounds are older than others. This is not made as a definite statement but such is our opinion. It is based on that fact that such tumuli as Nos. 84, 66, 61, and 39 contain very few pottery fragments, bones or broken stone. Other mounds such as Nos. 33, 32, 30 (which is really a part of 31), 76, and 11 (Kunnemann), on excavation were found to be composed of earth taken from a populous village site. The mounds in which very little material occurred were chiefly composed of black gumbo. An exception should be noted in the case of No. 66 (the Harding Mound), which was tested so superficially that even preliminary observations are scarcely in order.

It must be remembered that our augers took out cores from 6 to 7 inches in diameter, and altho they were frequently put down, yet the area these cores represent is but a minute portion of the structure as a whole. In the case of a trench or pit much more satisfactory observations are possible, yet pits in the large mounds are expensive and trenches even more so. Hence the use of augers as these would determine whether a mound was stratified. Obvi-

ously, augers might penetrate within a foot of either a burial or an altar containing objects, or a deposit of artifacts, and we would not know that such existed in the mound unless the auger cores when brought up included either bones or some other objects. Hence, construed technically, a mound may not be said to be properly tested if we depend on the auger cores for our information. It seemed to us, however, in view of the number of times these augers penetrated to the bases of mounds, that were burials or deposits of objects numerous they would have been encountered in some of the borings.

Since none of the very large mounds, notably 57, 60, 48, 5, 58, 41, and 42, were examined, it is possible that the interments are in these or in No. 38 (Monks). It is a question whether these largest ones could be tested by means of the augers. Probably tunnels will be necessary.

Considering that some of the mounds contain much refuse material scattered through the earth and others almost none, it would seem that two explanations might be offered. First, that the earth was taken from spaces on which had stood no cabins. Second, that these mounds were among the first constructed and when the village population was restricted. The fact that much material is found in mounds in which gumbo does not predominate might indicate that the natives did not place their cabins or wigwams on gumbo soil at that particular time, yet we do find a great deal of surface indication directly south of the largest mound, where gumbo soil predominates. Our explorations have not progressed sufficiently to determine positively this and other questions with any degree of finality, yet what little light we have been able to shed on the past would indicate that certain mounds were built before there was much population at Cahokia. Furthermore, it does not seem possible that all the mounds would have been constructed within a few years. There must have been a gradual, more or less systematic mound construction epoch covering a considerable length of time and quite likely several generations.

The soil around Mrs. Tippett's Mound (61) is mostly gumbo; the village site indications are not heavy, but several hundred yards north, where there is less gumbo, the village was thickly populated. It does not seem likely that the Indians would go any distance to secure the earth for the construction of No. 61. It would be more convenient to obtain it from points nearby and the two depressions marked "lakes" on the map probably represent the places from which earth was taken for 61 and 62, and probably for other mounds. A similar argument would apply to No. 84 located in an unfavorable spot for a village site, but it would not apply to others of the mounds. It will require a very careful study and comparison, as well as more research in the way of excavation, to determine these points. Whether it will be possible in the future to assign dates is quite problematical. Certainly the pits and trenches are sufficiently extensive to have brought to light objects of European manufacture had the Cahokia people lived here during the historic period. We are safe in assuming that the Cahokia Mounds are prehistoric, for not one single tool, weapon, ornament, or vessel of white man's make has been taken from any one of our hundreds of pits.

THE IMMENSITY OF CAHOKIA

After three seasons of exploration and considerable study, that which impresses one most is the immensity of Cahokia. That there is no mound group to compare with it north of Mexico is quite obvious. As the survey continues and extends its operations it becomes more and more evident that it will require considerable time and a great deal of work in order to secure sufficient data and specimens to reconstruct the ancient life of the Cahokia builders. One might not go far afield if he claimed that notwithstanding the amount of actual digging—there has been considerable—that the survey has but begun the real exploration of this place. Beyond question, the population was extensive—how numerous, we do not know, but certainly many thousands of Indians lived hereabout. According to the funeral customs of all mound building tribes previously

studied elsewhere in the United States, the most artistic and valuable objects were placed with the dead. That the survey has unearthed so little material is not to the writer discouraging, neither does it tend to imply that such material did not exist. On the contrary it is quite evident that we have not investigated the tombs in which the ranking personages of Cahokia were interred. Continued research will bring them to light.

NOTES ON CAHOKIA SKELETONS

By Dr. R. J. Terry
Washington University, St. Louis, Mo.

Skeleton No. 28. Cemetery in mounds 19, 20, 21. Skull, most of the vertebrae and ribs, parts of the sternum, fragments of scapulae, clavicles, right humerus, parts of both radii and ulnae, some hand bones, fragments of hip bones, both femora and right tibia, parts of both fibulae, some bones of the feet. Skeleton was found two feet beneath the surface; extended, head to the east, face upward. A univalve shell was found beneath the chin; five rough flints around the neck; a piece of sandstone marked with two straight grooves on opposite surfaces, a small bone spatula, pieces of ochre, and soft red hematite upon the chest. The bones are fragile, very dry, and porous. The cranium lacks the basioccipital and sphenoid; is symmetrical, broad, and high. Marked occipital taurus, tendency toward keeling of vertex; beginning closure of sagittal suture. Teeth much worn; incisors lost; lower molars all shed. Glabello-occipital length 16.8 cm.; greatest breadth 14.2 cm.; height 12.3 cm.; bigoniac breadth of mandible 9.8 cm. Clavicles slender, curved, right measures 14.7 cm.; right humerus, maximum length 30.7 cm.; right radius 24.1 cm.; right femur, maximum length 42.6 cm. Shape of shaft prismatic: platymeria marked. Right tibia presents shape of shaft No. 5 (Hrdlicka) length 34.5 cm. (medial malleolus lost); platycnaemy marked; retroversion of head slight.

Skeleton No. 29. Cranium large, broad and high; not well enough preserved to give trustworthy measurements. Marked asymmetry apparently post-mortem; vertex reaches highest point at obelion; sagittal suture closed. Slight keeling of vertex. Occipital taurus prominent. Bigoniac breadth 10.8 cm.; teeth much worn; shovel-shaped incisors; left lower canine, three ridged. Right clavicle slender, curved, length 15.8 cm. Humeri perforated; left large, right medium. Left humerus maximum length 32.1 cm.

Femora moderately platymeric; shape cylindrical to prismatic. Right bone maximum length 45.8 cm.; tibiae show pathological enlargement in diameters of shafts; head of left bone roughened, marked retroversion in right and obscure facet at lower anterior margin. All of the bones are very brittle and dry. A male skeleton.

Skeleton No. 1 consists of only a cranial fragment including face and frontal bone, left parietal and temporal. Very dry and fragile. Apparently a high cranium. Slight tendency to keeling. Dental alveoli all present; wisdom teeth not erupted: incisors and canines present lateral ridges.

Skeleton No. 100. Skull only, taken from cemetery at Pittsburg Lake. Well preserved. Glabello-occipital length 17.4 cm.; greatest breadth 13.6 cm.; height 19.4 cm. No tendency to keeling. No occipital taurus. Sagittal suture open; coronal obliterated inferiorly. Chin pointed, bigoniac breadth 8.8 cm.; teeth much worn. Evidently the skull of a woman.

The skulls excepting No. 100 have the highest point of the vertex about the obelion with a steep slant to the glabella. This head form is also strikingly marked in an endocranial cast that was obtained by lifting away the fragile bones of the cranium from the hard mass of gumbo which completely filled the cranial cavity. A plaster replica of this earth cast has been made and will be the subject of future study.

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Part II

THE GEOLOGICAL ASPECTS OF SOME OF THE CAHOKIA (ILLINOIS) MOUNDS

BY

Morris M. Leighton

Illinois Geological Survey

State Geological Survey Division
March 1, 1923

Dr. David Kinley
President, University of Illinois

Dear President Kinley:

The accompanying report on a geological investigation of Cahokia mounds by Dr. M. M. Leighton, undertaken at your suggestion, is transmitted for your information and for publication if desired.

The interest attaching to the mounds, and particularly the movement to include them in a state park, made it desirable to supplement the archeological investigations of Dr. W. K. Moorehead with those of a specialist in surficial geology, in order that all possible light might be thrown on the origin of the mounds. While there has been a decided difference of opinion, and casual consideration of the problem would lead a geologist to assume, tentatively, that the mounds are natural remnants of an alluvial terrace which has been mostly removed by erosion, the careful scrutiny of the excavations, supplemented by systematic auger borings and study of the oxidation and leaching of the materials in the mounds and under the surrounding flood plain, makes it clear that the mounds so far investigated are artificial rather than natural. Others which have not been studied may prove to be natural, but I am not justified in expressing an opinion in advance.

The careful observations and deductions by Dr. Leighton supplemented by my own less extensive studies may lead to a conclusion harmonious with that of Dr. Moorehead. I am glad to transmit the results of Dr. Leighton's efforts and to express the hope that the State may acquire and preserve these interesting and significant relics of a settlement and civilization in Illinois far back of anything recorded in the history of man.

Very respectfully yours,

F. W. DeWolf, *Chief*
State Geological Survey

INTRODUCTION

The Problem

For many years there has been a difference of opinion as to whether the group of mounds northeast of East St. Louis, on the American Bottom of the Mississippi River, has had a natural mode of origin, or whether they represent the work of mound-builders. Monks Mound has been pointed out by some as being the largest Indian Mound in North America, if not in the world, while others have insisted that it is natural.

In September, 1921, excavations were started in the smaller mounds by Professor Warren K. Moorehead, Archeologist, of Andover, Massachusetts, and continued for two months under the joint auspices of the University of Illinois and the Illinois State Museum Division. The following spring and fall of 1922, the exploratory work was assumed entirely by the University.

The excavations afforded an excellent opportunity for a geologic examination of the materials composing the mounds, and in this work the State Geological Survey Division cooperated. The writer was requested to undertake the geological work. Five visits of about two days each were made at advantageous times for inspection, and the data for the following report were collected.

Acknowledgments

The writer wishes to express his sincere thanks to the Ramey family, owners of Monks Mound and other mounds; to Mr. Schmidt, owner of the Schmidt Mound, and to Mr. Kunnemann, owner of the Kunnemann Mound, for the privileges they extended and their hearty spirit of cooperation; to Professor Warren K. Moorehead for his contribution of men for certain manual labor necessary to the study; to Curator Frank C. Baker, of the Museum of Natural History, University of Illinois, for his identification of fossil shells found in the mounds

and the east bluffs; and to Professor W. S. Bayley of the Department of Geology, University of Illinois, for his identification of certain rock materials. The writer also acknowledges his indebtedness and gratitude to F. W. DeWolf, Chief of the Illinois Geological Survey, who by his discussions and suggestions contributed scientifically to the success of the study.

FORMER OPINIONS OF GEOLOGISTS REGARDING THE ORIGIN OF THE MOUNDS

In searching the literature for opinions regarding the origin of the mounds, the writer has been careful to select those of geologists, rather than those of archeologists, inasmuch as the supreme motive of the former is to critically study and properly interpret land forms and the materials of the earth, while the archeologists are interested primarily in the physical, mental, and social characteristics and activities of pre-historic man.

The Views of G. W. Featherstonhaugh, F.R.S., F. G.S.—During his travels in 1834 and 1835 from Washington, D. C., to the frontier of Mexico, the English geologist, G. W. Featherstonhaugh, visited the Cahokia mounds, and gave his account in his book, "Excursions in the Slave States," Vol. I, 1844, pp. 266-270. Featherstonhaugh evidently did not doubt the human origin of the mounds, for he offered no suggestions to the contrary and definitely states that "the soil of which the mound consists is the rich black mould taken from the surface below. . . ." (p. 268).

The Views of Professor A. H. Worthen.—As early as 1866, the natural theory of the origin of the mounds received the support of a no less reputable geologist than Professor A. H. Worthen, Director of the Geological Survey of Illinois. Professor Worthen, in Volume I of the Geological Survey of Illinois, page 314, considered the mounds as "proof" that the Mississippi Valley had been filled to a height of 50 or 60 feet above its present level and that this was "in part removed by subsequent erosion during the period of elevation and drainage that succeeded the drift

epoch." Artificial exposures in the large mound in the upper part of the city of St. Louis, now destroyed, were examined by him, and these showed about 15 feet of common chocolate brown drift clay at the base, overlaid by 30 feet or more of "the ash colored marly sands of the loess, the line of separation between the two deposits remaining as distinct and well defined as they usually are in good artificial sections in the railroad cuts through these deposits."

From this he inferred that the "mounds are not artificial elevations .... but, on the contrary, they are simply outliers of loess and drift, that have remained as originally deposited, while the surrounding contemporaneous strata are swept away by denuding forces."

It seems pertinent to call attention to the fact that the science of Glacial Geology was scarcely beyond its embryonic state at this time, and but little more could be claimed for the sciences of Physiography and Sedimentation.

The Views of William McAdams.—William McAdams, a teacher and careful observer of natural science, including geological phenomena, regarded Monks Mound (called by him Cahokia Mound) as of artificial origin. In his pamphlet, "Antiquities of Cahokia, or Monk's Mound in Madison County, Illinois," Edwardsville, Illinois, 1883, pages 2-3, he says:

"Since some doubts have been expressed as to the artificial origin of this structure we were much interested to ascertain what could be learned in this respect by examination. On the top of the pyramid are the remains of a house, said to have been commenced by the monks, but afterwards added to and finished as a comfortable residence for the family of a man named Hill, an enterprising settler who owned the mound and a large body of land adjoining. Beneath this house is a deep unwalled cellar. A section down the side of the cellar to the depth of ten feet very plainly revealed a deposit of various kinds of earth without stratification. The principal part of this deposit was the black humus or mould, so common in the bottom and forming the principal soil, very sticky when wet and breaking into cubical blocks when dry. Here and there, as if thrown promiscuously among the black mould, is a bunch of yellow clay, or sand, or marly loess, these bunches being about such size as a man could easily carry.

"Similar sections can be seen up the old road made by Hill to ascend to his residence.

"About midway, on the north side, or face of the pyramid, and elevated 25 or 30 feet above the base, in a small depression, stands a pine tree, singularly enough, since this tree is not found in the forests in this locality. There was a story rife among the early settlers that this tree stood at the mouth of an opening or gallery into the interior of the mounds. To ascertain the truth of this matter, Mr. Thomas Ramey, the present owner of the mound, commenced a tunnel at this tree and excavated about ninety (90) feet towards the center of the mound. When fifteen feet from the entrance to the tunnel a piece of lead ore was discovered, but no other object of interest was found. The deposits penetrated by the tunnel are very plainly shown to be the same as seen in the cellar mentioned above."

Mr. McAdams republished a paragraph from Edmund Flagg's book on "The Far West," 1838, p. 167, regarding an old well on the Mound. Flagg's description reads:

"Upon the western side of Monk Mound, at a distance of several yards from the summit, is a well some eighty or ninety feet in depth; the water of which would be agreeable enough were not the presence of sulfur, in some of its modifications, so palpable. This well penetrates the heart of the mound, yet, from its depth, cannot reach lower than the level of the surrounding plain. I learned, upon inquiry, that when this well was excavated, several fragments of pottery, of decayed ears of corn, and other articles, were thrown up from a depth of sixty-five feet; proof incontestible of the artificial structure of the mound."

The Views of Doctor N. M. Fenneman.—Doctor N. M. Fenneman of the University of Cincinnati believes that the valley was much aggraded in the Wisconsin epoch, but that this filling has not been entirely removed, there being remnants left within the cut-offs of the meanders which were later eroded, dissected, and narrowed "by the meander of the main stream and its tributaries until mounds were produced.[1] Among those," he continues, "was the great natural hill which was subsequently modified by man and is now the partly artificial Monks Mound.

"The partly artificial character of Monks Mound is evident from its form. That it is in part a natural feature, is seen by its structure. Sand is found neatly inter-stratified with loam at an altitude of about 455 feet, or 35 feet above its base. To this height, at least, the mound is natural and as there is sufficient other evidence that the valley was

[1] *Physiograyhy of the St. Louis Area*, Ill. State Geol. Survey Bull. 12, 1909, pp. 62, 63.

filled in the Wisconsin epoch to at least that height, the original mound may be regarded as a remnant of the alluvial formation of that time. Its base was probably narrowed artificially by the removal of material which was carried to the top. In this way also the conspicuous abruptness of its slopes was probably produced. No natural stratification has yet been found more than 35 feet above its base and therefore, for aught that is now known, more than half its height may be artificial. There is therefore no reason at present to deny to Monks Mound the distinction claimed for it of being the largest artificial mound of its kind in the world. The time of its building and the people by whom it was built are unknown.

"The many other mounds within a mile or two of Monks Mound had the same origin. Several of the larger ones have been similarly altered artificially. The low ones of gentle slope and less definite outline are believed to be in their natural forms.

A later statement[1] reads: "To a height of 35 feet above its base the material of Monks Mound shows assortment and stratification, which is evidently natural. Above that height it affords no structural evidence bearing on the question whether it is of natural or artificial origin; but the form plainly indicates the work of man, and not of geologic processes. It is highly probable that the mound in its natural condition was much lower and broader than at present, and was of rounded, almost drumloidal form, similar to the smaller ones of the group which now surround it. By cutting down its margin to the level of the surrounding plain its builders obtained material to raise the mound to perhaps two or three times its former height without making excavations beneath the level of the plain and without carrying material from the bluffs, 2½ miles distant. There is no evidence that material was obtained by either of these latter means."

The Views of Doctor A. R. Crook.—At the Philadelphia meeting of the Geological Society of America, December 29-31, 1914, Doctor A. R. Crook, Chief of the State Museum Division, presented a paper on the "Origin of Monks Mound," based upon 25 borings made in the north face of the mound, and upon an examination of the surrounding mounds and the valley bluffs two miles away. Quoting from an abstract of this paper which appears in Volume 26, 1915, of the Society, pages 74, 75, he says:

"Twenty-five borings were made in the north and most abrupt side. 1. They showed different strata at different elevations. 2. These strata agree with similar elevations in the other mounds and with

[1] *Geology and Mineral Resources of the St. Louis Quadrangle*, U. S. Geological Survey Bull. 438, 1911, p. 12.

soil from the bluff two miles away. 3. Fossil hackberry seeds *(Celtis occidentalis)* and such gastropods as *Pyramidula, Succinea, Helicina,* and *Physa* are found in beds. 4. A study of the physiography of the mounds makes clear that they occur along the divide between streams, and that their arrangement and individual forms are characteristic of the remnants of stream cutting.

"Chemical and mineralogical study of the soil, as well as paleontological and physiographical investigations, indicate that the mounds are the remnants of the glacial and alluvial deposits which at one time filled the valley of the Mississippi River in this region.

"It may be well to inquire if all so-called mounds in the Mississippi Valley are not natural topographic forms."

Doctor Crook held to the same view in subsequent papers[1] until May, 1922, when he published a bulletin on "The Origin of the Cahokia Mounds" under the auspices of the Illinois State Museum. In this bulletin, which was written following a field conference between him and the present writer when several of the mounds were excellently exposed for study, he inclines strongly towards the artificial theory of origin and has since definitely expressed himself in favor of that theory.[2]

[1]"The Composition and Origin of Monk's Mound," *Trans. Ill. Acad. of Sci.,* Vol. 9, 1916, pp. 82-84; Additional Note on Monks Mound, *Bull. Geol. Soc. Amer.,* Vol. 29, 1918, pp. 80, 81.

[2]Remarks before the Section of Geology and Geography, Illinois Academy of Science, Galesburg meeting, 1923.

GENERAL DESCRIPTION OF THE MOUNDS

Our chief concern in this connection will be to fix our attention upon those points which are of significance in the question of the origin of the mounds. The reader whose interest carries him into archeological questions and interpretations is referred to (1) Part I of the present volume, (2) a preliminary paper on the Cahokia Mounds by Warren K. Moorehead, and (3) the bibliography at the end of Part I. If, on the other hand, the reader is interested in a brief summary of the geologic evidences and conclusions he is referred to the summary statement at the close of this paper. The discussion which now follows is a rather detailed treatment of the geologic aspects of the mounds so far as they have been examined.

Number, Size, and Shape

Some eighty mounds have been mapped within a radius of about 1½ miles, and more widely scattered mounds are to be found in adjacent territory. Monks Mound dominates them all. It stands about 100 feet high above the plain, and the longer side of its rectangular base is about 1000 feet and its shorter side about 700 feet. An inspection of the map, Plate XXII, will show approximately the comparative sizes in ground plan of the rest of the important mounds. The smallest mounds are mere swells of the surface and are not shown on the map. In shape the mounds range from pyramidal forms, with nearly rectangular bases, to elongate ovoid and conical forms. Rain-wash and farming have modified some of the pyramidal mounds and given them sub-rectangular to sub-oval basal outlines. Some are flat-topped and, as in No. 48, have sufficient summit area for a residence site. Practically all of the mounds which are large enough to attract attention have a distinct artificiality in their regularity of form and steepness of slope (Plates XIX, XX). They lack the irregularity in ground plan and the wide range in summit area so characteristic of erosional remnants and they show no meander

scars at their bases or on their slopes. They are but little sculptured by slope-wash—Monks Mound the most of all—which speaks for their recency geologically, altho they may be rather ancient historically. Some of the larger mounds, those about 30 or 35 feet high in the vicinity of Monks Mound, show some accordance of level.

MONKS MOUND

Monks Mound has some peculiarities of form worth noting, which were faithfully described by McAdams:[1]

"On the southern end, some 30 feet above the base is a terrace or apron, containing nearly two acres of ground (Plate XXI). On the western side, and some thirty feet above the first terrace, is a second one of somewhat less extent. The top of the mound is flat and divided into two parts, the northern end being some 4 or 5 feet higher than the southern portion. The summit contains about an acre and a half. Near the middle of the first terrace, at the base of the mound, is a projecting point, apparently the remains of a graded pathway to ascend from the plain to the terrace. The west side of the mound below the second terrace is very irregular, and forms projecting knobs, separated by deep ravines, probably the result of rain-storms.... The remaining sides of the structure are quite straight and but little defaced by the hand of time."

It should be added that on the north side, there are projecting spurs, 50 to 100 feet long and 30 to 50 feet high. Some have horizontal summits, while others are sloping and have the form of approaches. This is the most abrupt side and some gullying has no doubt taken place. On the east side there is some evidence of creep of considerable masses of material and deposition at the base of the mound of material washed down from above.

The present writer's impression of the form of this huge mound with its platforms and approaches is in harmony with that of Dr. Fenneman, that it "plainly indicates the work of man and not of geologic processes."[2]

ARRANGEMENT OF THE MOUNDS

There are certain significant points regarding the arrangement of the mounds. (1) The elongate mounds are, in

[1] *Records of Ancient Races in the Mississippi Valley*, St. Louis, 1887.

[2] *Geology and Mineral Resources of the St. Louis Quadrangle*, U. S. Geological Survey Bull. 348, 1911, p. 12.

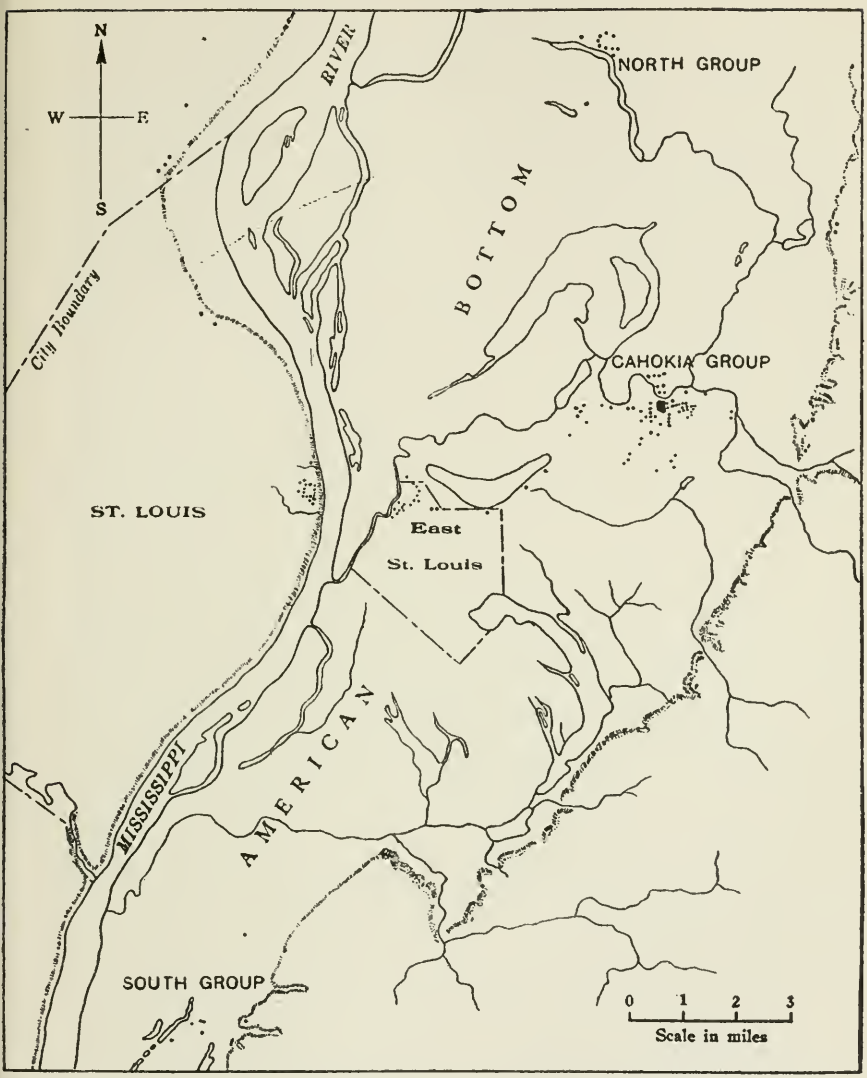


Fig. 8—Map showing the location of the Cahokia Group. (After David I. Bushnell, Jr., Smithsonian Institution)

most instances, oriented with respect to the cardinal points of the compass, either north-south or east-west. (2) Some have a striking alignment, as for example, Nos. 19 to 26 and 6 to 11 (see Plate XXII), and this alignment as well as their orientation carries the aspect much more of the human mode of origin than by ordinary physiographic processes. (3) The grouping of the mounds on the American Bottom is shown in Fig. 8. This grouping, as well as the alignment and elongation, is not in harmony with the theory of terrace remnants or any other physiographic origin to which they can tenably be referred.

THE GEOLOGICAL SETTING OF THE MOUNDS

Topographic Position

The American Bottom.—The Cahokia Mounds are situated upon the great flood-plan of the Mississippi River, known as the great American Bottom, some four miles northeast of the center of East St. Louis (Fig. 8). The mounds offer the only relief possessed by this extensive flat except the valley bluffs which bound it. Before the artificial levees were built, large portions of the flood-plain were subject to the highest floods, but so far as the writer could learn there has been no time in the history of the settlement by white man that all of it was under flood-waters. Even today, with the artificial levees, the flood-waters back up into some of the abandoned channels previously occupied by the Mississippi River, as for example the old channel now followed by Cahokia Creek, in its wanderings across the plain.

The highest known flood-level of the Mississippi River at St. Louis was in 1844,[1] when the waters rose 7.58 feet above the city directrix, reaching an altitude of 420.31 feet above sea-level. According to the topographic map of the St. Louis quadrangle, published by the U. S. Geological Survey, involving the site of the Cahokia Mounds, there are considerable areas above the 420-foot level along the foot of the east valley wall and in the vicinity of Granite City. Monks Mound and a few others nearby are on a slight swell a little above 420 feet, but the surface surrounding most of the others appears to be somewhat under that level. Hence, it is thought that many of the mounds were surrounded by this flood. The flood of 1903, 2 or 3 feet below that of 1844, reached and covered the low sags in the vicinity of the mounds.

The valley has a maximum width of about 12 miles just north of Granite City and a minimum of 3¾ miles south of the village of Cahokia. In the latitude of the mounds it is about 9½ miles wide. The valley flat is

[1]Woodward's *The Saint Louis Bridge,* G. C. Jones and Co., Publishers, St. Louis, 1881, p. 2.

traversed by many old channels—former courses of the Mississippi River—showing that many shiftings have taken place in recent geological times, and the existence of ox-bow lakes in several of these indicate an occupancy so recent geologically that they have not yet been filled. Besides the distinct abandoned channels, faint sags apparently represent earlier channels.

The East Valley Wall.—The east valley wall rises from 150 to 200 feet above the valley flat. It is generally a distinct bluff, notably steep in spite of the weak resistance of the Coal Measures shale and Pleistocene clays of which it is chiefly composed, and surprisingly steep when the width of the valley is considered. This has an important bearing upon the activity of the Mississippi River, making it clear that this great stream frequently shifts its course, geologically speaking, striking the valley wall here and there and preventing weathering, slope-wash, and creep from making the slope gentle.

THE ALLUVIAL FILLING

Thickness and Characteristics.—The filling of the valley is considerable; the bedrock floor lies deep. The upper 10 to 12 feet is mud and clay, beneath which is 50 to 100 feet of sand with subordinate beds or lenses of clay and gravel, and gravel and boulders at the base.[1] The position of the bouldery material at the base has a special significance. Great changes in the volume of the stream take place in response to heavy rainfall or rapid melting of snow over the large basin which the river drains, and this greatly modifies the velocity and the stream's transporting power. At St. Louis, the velocity of the Mississippi River has been known to vary from 2¾ miles per hour at low water to 8½ miles per hour at high water, or three-fold. In time of high flood, therefore, the stream scours deeply, probably reaching and abrading the bedrock, making it necessary for the piers of the bridges at St. Louis to be sunk into the rock. When the excavations were made by the engineers

[1]Fenneman, N. M., *The Physiography of the St. Louis Area*, Ill. State Geol. Survey Bull. 12, p. 6, 1909.

for the St. Louis bridge, and the bed-rock was laid bare, the rock surface was found to be smooth and water-worn and to be overlain by the heavier debris of river floods.[1] There have been known instances of scour reaching nearly 100 feet. The larger materials are moved at a slower rate than the smaller, and are the first to be deposited, upon the slackening of the current during the ebb of the flood. Altho the scouring is probably local in the bed of the channel during any one flood, yet in successive floods all points along the channel may become affected.

The Age of the Alluvial Filling.—In view of (1) the scouring action of this great stream along its present channel and the alternate play of scour and fill; (2) the abundant evidence that in the past the stream has had almost every conceivable position on the valley-flat; (3) the lateral shifting of the meanders, cutting on the outside of the curves and filling on the inside; (4) the length of post-glacial time having probably been sufficiently long for this great stream working in loose and fine materials to plane the full width of the valley several times, and (5) the gradation from bottom to top of coarse to fine, it would appear that the larger part if not all of the present alluvial filling has been worked over and repeatedly shifted down-stream and that its present position is due to the action of the stream in the Recent epoch. It is in a transitory state of rest; it is the "potential" load of the present stream. Therefore, it seems proper to regard it as chiefly post-glacial in age.

REMNANTS OF THE ORIGINAL GLACIAL FILLING

Inasmuch as this portion of the Mississippi River received glacial drainage from more than 2,000 miles of ice front of the Wisconsin Glacier—from the basin of Illinois River to the Rocky Mountains—it would be expected that the valley here would show evidence of fill, provided it was given more load than it could carry; and since this locality was far from the ice edge, that such a filling would be composed dominantly of fine material; and further, that since the

[1]Woodward, op. cit., page 5.

volume of the glacial waters varied greatly between the winter and summer seasons, the glacial Mississippi behaved much as the modern Mississippi, only on a much larger scale; and moreover, that since the suspended load and bed-load were probably greater, the amount of filling during the recession of floods would average greater and the average level of the flood-plain would be higher.

Evidence of such a condition appears to exist chiefly in the mouths of some of the tributaries,—Canteen Creek and Prairie du Pont Creek, where alluvial terraces are found, some of them rising 40 to 60 feet above the Mississippi valley flat. The material of these terraces, however, is probably not so much that brought down by the Mississippi River as that washed down from the uplands and deposited in the back-water of the tributaries due to filling in the main valley. But in either case they seem to record a former higher filling in the main valley than now exists, which is the significant point in this connection.

This period of aggradation was brought to a close by the melting back of the ice into the basins of the Great Lakes and Lake Agassiz. From these bodies of water three great streams of relatively clear water combined and formed a Mississippi of more constant volume than before. Just how the amount of this water would compare with the maximum summer floods which had been coming down the valley from the glacier before the lakes came into existence is problematical, for, on the one hand the length of the ice front was now much less, and on the other the climate was becoming warmer and the rate of melting greater. An important point to keep in mind tho is this. The waters from Lake Chicago and its contributary area to the east, the waters from Lake Superior, and the waters from Lake Agassiz formed a stream of very large volume, with less fluctuation than when the drainage came direct from the ice, and since most of the sediment had been dropped in the lakes, the outflowing waters were much less loaded.

This condition of flow lasted during the building of several recessional moraines and a corresponding number

of periods of ice recession,[1] probably resulting in a lowering of the former glacial flood-plain, and probably to a level considerably below the present plain. Indeed, the previous fill may have been entirely swept away and the rock-floor subjected to abrasion, but this cannot be affirmed.

POST-GLACIAL CONDITIONS

With (1) the melting away of the ice from the basin of Mississippi River, (2) the establishment of the outlet of the Great Lakes by way of St. Lawrence River, (3) the disappearance of Lake Agassiz, and (4) the melting of most of the contributing Alpine glaciers of the Rocky Mountains, the drainage conditions of the Mississippi River assumed approximately their present proportions and variations. Inheriting the low gradient of the preceding epoch, the Mississippi of smaller volume must have built up its flood-plain to its present level.

The widespread distribution of abandoned channels and the absence of any tendency on the part of the present stream to break up into distributaries indicate that the present flood-plain is essentially at grade or some of it is slightly above grade because of the present fairly straight course of the stream. Before the stream assumed its present course, it meandered widely, as the abandoned channels and ox-bow lakes indicate. Under those conditions much of the present flood-plain was formed. With the stream subsequently assuming the present nearly straight course, probably at a time of widespread overflow, its gradient became higher and its transporting power greater, enabling it to develop a narrow flood-plain adjacent to the channel slightly below the rest of the valley flat, thereby reducing for the present the chances and the frequency of widespread flooding other than in the old abandoned channels and adjacent low areas.

[1]Some of the recessional moraines are known to have been built after a re-advance of the ice following an unknown amount of melting back, but the volume of water was doubtless less during the advance of the ice than during the retreat.

BEARING UPON THE AGE AND ORIGIN OF THE CAHOKIA MOUNDS

(1) The enormous scour and fill of the Mississippi during the rise and ebb of floods; (2) the fact that the stream has shifted to many different positions over the valley flat; (3) the fact that this shifting has been so frequent that abandoned channels of the second or third stages back are not entirely filled before another shift takes place; (4) the absence of any remnants of filling which clearly correspond to the terraces in the mouths of some of the tributaries; and (5) the fact that the mounds do not show the scars of meander curves on their slopes or at their base as they would if they were remnants of a former higher fill,—when we consider these things, it appears doubtful that the mounds are either natural or that they are as old as the present valley flat.

If this conclusion is correct, the mounds themselves should reveal this in their constitution; should have no nuclei of natural origin, and should rest upon alluvial materials as a foundation. We may well give our attention to this phase of the question.

CONSTITUTION OF THE MOUNDS

There was opportunity to study the character and structure of the material in four mounds, and as a matter of record, these will be discussed separately. These mounds were: the James Ramey Mound, No. 33; the Albert Kunnemann Mound, No. 16; the Sam Chucallo Mound; and the Sawmill Mound, No. 39. As will be seen from Plate XXII, these mounds are widely spaced and are fairly representative of the mounds which range in height from 12 to 35 feet. The James Ramey Mound, No. 33, situated a quarter mile east of Monks Mound, was the most thoroly opened and examined in the greatest detail.

The James Ramey Mound, No. 33

This mound was trenched through its center in a north-south direction, nearly to the level of the surrounding valley flat and a fine opportunity was presented for ascertaining the composition, degree of assortment, arrangement of the materials and their relations to the materials of the valley flat.

General Description of the West Face.—In the west face (Fig. 9), Formation 1 is made up chiefly of yellowish sand with balls and irregularly shaped inclusions of dark silt scattered through it. It is unstratified and has the spotted and lumpy appearance of man-made fills. It is cut off abruptly at the south end. Formation 2 is a mixed gray and yellowish silt and sand with scattered charcoal fragments. The upper surface is strongly undulating. At (a) is a reddish brown horizon having every appearance of having been the site of a bonfire. Charcoal fragments occur in the material. Formation 3 is a mixed gray and yellowish silt and sand with included masses such as is shown in the figure. In the north end is a peculiar mixed mass, (c), and a filling in a well-defined cut-out, (b). At (a) is another apparently burned horizon with charcoal fragments associated with it. Formation 4 is a yellowish sand with an abundance of charcoal fragments up to 1½ inches in diam-

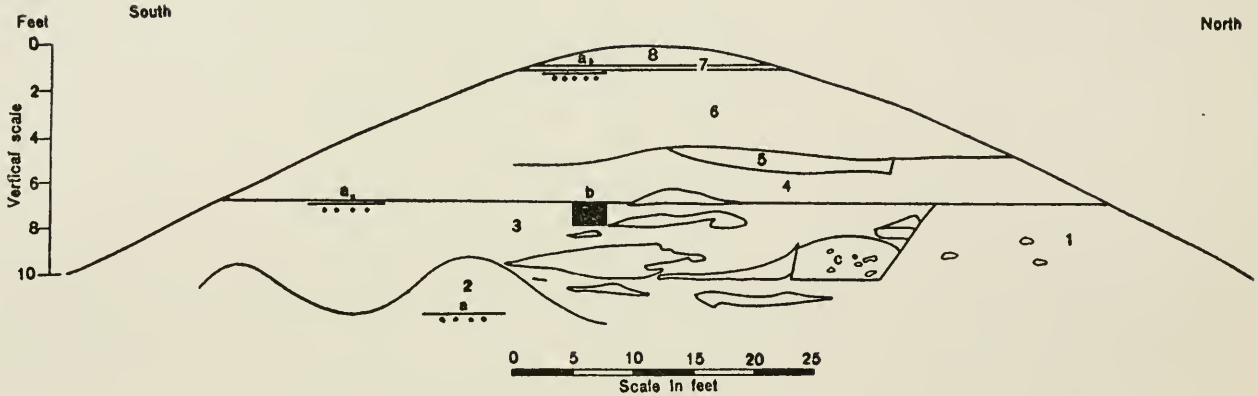


FIG. 9.—Diagrammatic sketch of the west face of the trench, James Ramey Mound. Subsequent excavation extended the section to a depth of about 20 feet.

eter. Formation 5 is finely stratified sand about 8 inches thick—the only clear case of water stratification in the section. It ends bluntly at its northern end and pinches out at its southern. Formation 6 is a fine yellowish sand with bits of charcoal. Formation 7 is a well-defined horizon with an apparent burned horizon at its south end. Formation 8 is a fine grayish yellow sand with some small lumps. Throughout the whole section bones and pottery, artifacts of flint, and angular fragments of travertine and charcoal were found, varyingly oriented. Near the center of the cut a boring was put down with a post-hole digger, and at a depth of about 20 feet from the top of the mound, a fairly large piece of charcoal and a piece of pottery were found. Another boring yielded bones and pottery at a depth of 18 to 19 feet. Regarding the occurrence of human skeletal remains in this and other mounds, the reader is referred to Part I of this publication.

Detailed Description of a Vertical Section in two Dimensions.—A chimney-like section, 3 feet square, was dug in the west face of the main trench and a detailed sketch and description were made of the south and west sides of this section. (Fig. 10.) The description follows:

	Thickness Feet
7. Fine grayish yellow sand, with lumps of gray clay which give a spotted effect; a few small fragments of charcoal up to ¼ inch in diameter; the material effervesces to the surface altho it is dark in the upper 3 to 4 inches	2 to 3
6. Interlayered dark and light fine sand and sandy silt, the lower portion with many charcoal fragments, a scattering in the upper part; layers discontinuous and horizontal in the south face, dipping southward in the west face; a few fragments of bones (one a bone of a bird); some fragments of pottery.....	2¼
5. Mottled fine silty sand in indefinite layers; a heterogeneous mixture of highly calcareous and slightly calcareous material with no indication of secondary concentration or differential solution; no assorting; a few tiny particles of charcoal.....	3¾
4. Dark clay layer, something like gumbo, with fragments of pottery and charcoal; thickness.....	¾

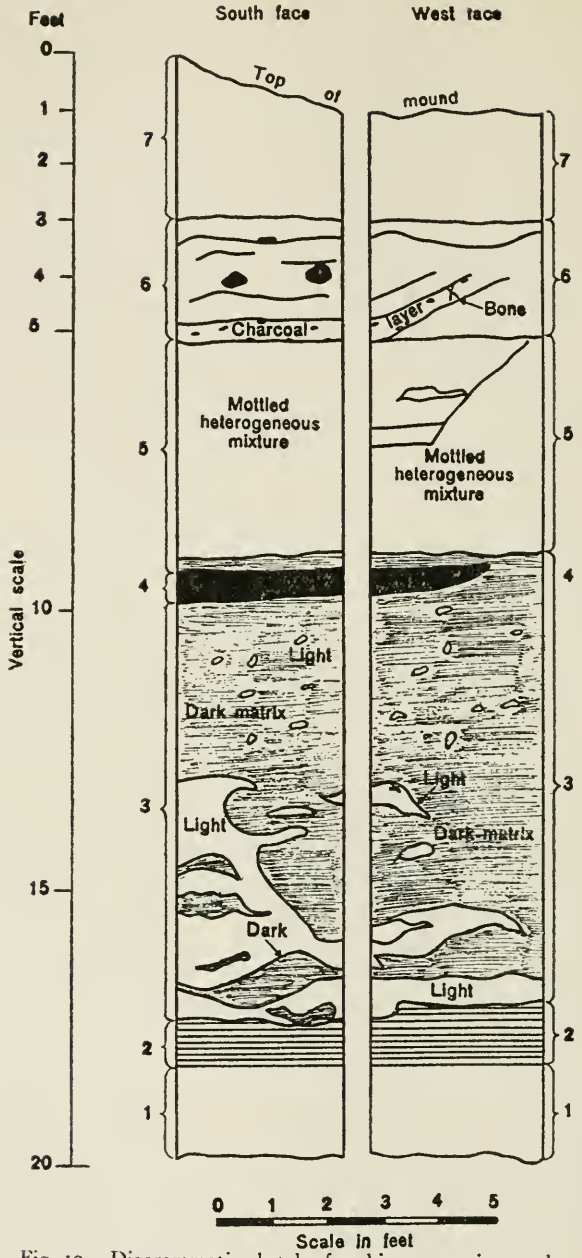


Fig. 10.—Diagrammatic sketch of a chimney section made in the west face of trench, James Ramey Mound.

3. Mostly dark fine sandy silt with light mottling, some brownish clay; irregular lenses and balls of the light colored silt in a dark matrix, and lenses and balls of the dark in the light; the light parts are more calcareous than the dark; a few charcoal and pottery fragments..... 5¼
2. Fine stratified silty sand, yellowish gray; calcareous; charcoal fragments mostly minute but two fragments up to 1 inch; layers of sediment thin, numbering 3 or 4 to the inch. These beds fade out to the east, changing upward to mixed material as if the stratified portion were deposited in a local pool in the mound... 1
1. Massive dark gray silt, no stratification, scattered specks of charcoal, non-calcareous..... 1¾

Special Features of the West Face.—Bones and fragments of pottery were found throughout the vertical section of the mound. In the west face of the trench was found a linear series of holes, about 30 in number in a distance of 23 feet, most of them less than 6 inches in diameter and about 2 feet in depth. Altho they had been completely covered over by at least 9 feet of earth, the holes were only partly filled with dirt. In the bottom of many of them occurred brown decayed bone; a small leg bone of a bird was still preserved. It appeared that originally the holes had been filled with bones before the overlying earth was put on and later the bones decomposed leaving the holes unfilled and a residue of bone material in the bottom. The series trended nearly due north-south and while most of the holes were vertical, a few slanted 10 degrees from the vertical. The full series was not entirely uncovered, for the north end curved slightly west of north into the west face. Such features must be human in their origin.

General Description of the East Face.—A section of the east face is shown in Fig. 11. A-A^1 is a well defined horizontal horizon marked by burned lenses (b) and short stretches of coarse sand (c). The burned lenses are 2½ inches in maximum thickness and up to 3 feet long. They are reddest in the center with charcoal fragments immediately beneath and at the ends. The materials, including the sands, effervesce with acid. Below

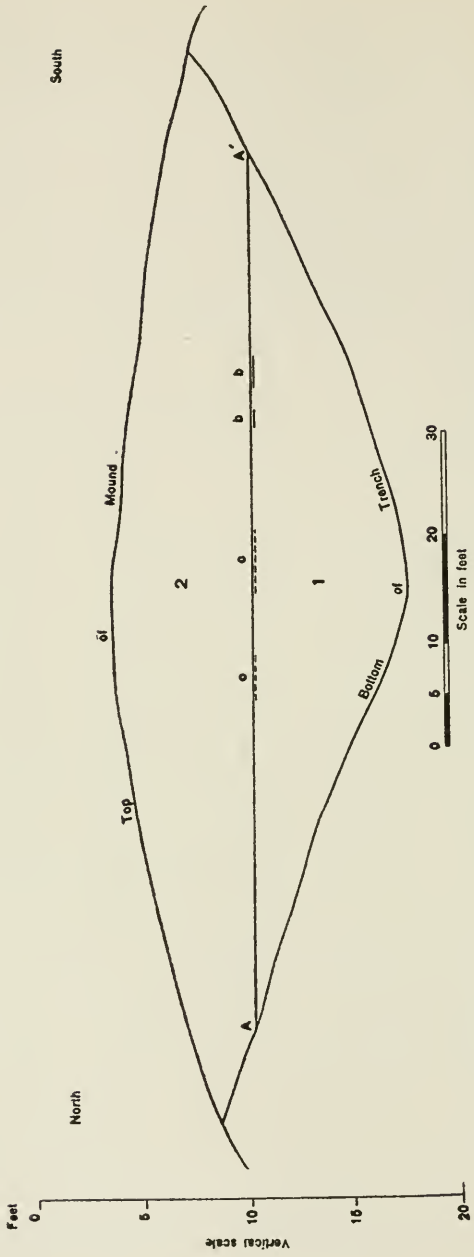


FIG. 11—Diagram of the arrangement of materials in the east face of the trench, James Ramey Mound.

the sharp horizon is Formation 1, a dark, fairly compact silt, irregularly layered and with greenish lenses and some yellow sand layers. In this case the dark is distinctly less calcareous than the light, and charcoal is generally scattered through them. Above the sharp horizon, is Formation 2, a fine sandy silt mottled dark and light, arranged without order in irregular lenses, balls and masses up to 4 inches in diameter. Both the light and the dark are calcareous, and charcoal fragments are scattered through them promiscuously. Bones and fragments of pottery were found from bottom to top of the section. A large marine shell was uncovered near the west end 3 or 4 feet below the surface. Similar shells were found in other parts of the mound, one at a depth of 17 feet.

The mound was about 23 feet high. At a depth of 19½ feet, pottery, bones, and flint were found, some of them on end. The containing matrix was a fine, sandy silt, gray with brownish tinge and slightly calcareous. A fragment of calcareous tufa and a one-inch fragment of charcoal, which clearly exhibited the structure of the original wood were found at the 18-foot level. All of the material, save for a thin lens of finely stratified sand, had the appearance of having been dumped, mixed, and spread by human agencies. It was indeed a motley mixture.

Significant Features Common to Both Sides of the Trench.—(1) The materials are not stratified or assorted like waterlaid sediments, except as above mentioned, tho they have a stratiform arrangement.

(2) The contacts of the various layers are quite irregular in detail, (figure 12), sharp projections of one fitting into the sharp indentations of another. This shows that the surface upon which each layer was spread was irregular in detail altho nearly level, and could not be due to deposition in quiet or slack-water. They are such as would develop from human hands spreading silts and fine sands over a surface previously smoothed artificially but retaining minute irregularities. This is also in harmony with the mixed aspect of the materials.

(3) Some horizons in the mound are reddish brown, with charcoal fragments closely associated. The reddish

color does not appear to be due to natural processes of oxidation in view of the presence of the charcoal, which is reducing in its chemical reaction, and of the promiscuous and limited occurrence of material of reddish color. Its association with charcoal would seem, on the other hand, to point to bonfire oxidation.

(4) Both sides of the trench show a content of bones of several forms of life; shells of gastropods whose habitats vary from terrestrial, fluviatile, and lacustrine of local occurrence to the large ornate marine shells from the Gulf of Mexico; shells which have been shaped or perforated

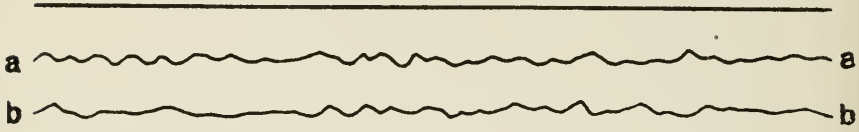


FIG. 12—Diagrammatic sketch of the minutely irregular contacts between the layers of fine material in the mounds.

as ornaments of utility and dress; artifacts of various sorts; flint chips which are at least in part refuse of the Indian stone arts; and travertine fragments apparently derived from local spring deposits. Many of these lack the orientation with the stratiform character of the layers which would be expected if they were alluvial in origin. Such an assemblage of "fossils," such a promiscuous arrangement, and such a complete absence of signs of water attrition is decidedly in agreement with the conception of an artificial mode of origin for this mound.

The Basal Contact of the Mound.—An important question bearing on the origin of the mounds is whether or not the materials of the surrounding plain pass under them. When the trench through Mound No. 33 reached approximately the level of the surface outside of the mound, the writer hoped to ascertain the exact situation by having three pits dug, two of them in the bottom of the trench, near the center of the mound, each 3½ feet square and 4 feet deep, the third outside of the mound,

190 feet east and 137 feet south of the center of the mound, on the valley flat, this pit being 3½ feet square and 3½ feet deep.

The pit outside of the mound exposed:

	Thickness Feet
4. Black soil, no pebbles	½ to 1⅓
grades into	
3. Non-calcareous silt, dirty buff	½
grades into	
2. Non-calcareous silt, yellowish, somewhat mottled, one band somewhat rusty colored, ¾ to 1 inch wide	1½
1. Sandy silt, non-calcareous, yellowish, watery	1

All of the latter section looked natural. There was found no pottery, charcoal, bones, flints, shells, lumps, or other material of human derivation, and neither was there any mixing of materials.

The pit nearest the center of the mound showed:

	Thickness Feet
3. Dark gray, sandy silt, slightly effervescent with acid, containing an occasional charcoal fragment	¼ to ¾
2. Brownish yellow silt, containing old rootlet channels stained rusty, non-calcareous, limonite, and pellets of $CaCO_3$ up to ¾ inch; no distinct stratification, no charcoal or artifacts here; no sign of disturbance; has every appearance of being a former sub-soil	1
1. Fine silty sand, calcareous, scattering of small shells of gastropods, grayish yellow color, some iron oxide spots and streaks, no sign of disturbance	2

The second pit beneath the mound, dug 8 feet south and 15 feet west of the center, starting 20 feet below the top, showed:

	Thickness Feet
2. Grayish yellow, fine sandy silt with old root canals stained rusty, very slight effervescence with acid, apparently an old sub-soil	1½
1. Yellowish gray, fine sand, calcareous, after striking water the sand behaved like quicksand	2½

These materials were all undisturbed and had every aspect of being natural. They seem to be without question the materials of the flood-plain passing under the mound.

THE ALBERT KUNNEMANN MOUND, NO. 16

About ¾ of a mile north of Monks Mound, on the north side of Cahokia Creek, is a large mound known as the Albert Kunnemann Mound. Along a part of the north side of this mound, an excavation was made giving a fairly abrupt face 60 feet long and 30 feet high, the lower 10 to 15 feet being covered. The arrangement of the materials is shown in figure 13. Upon cursory inspection they appear to constitute a stratified deposit, but inasmuch as a de-

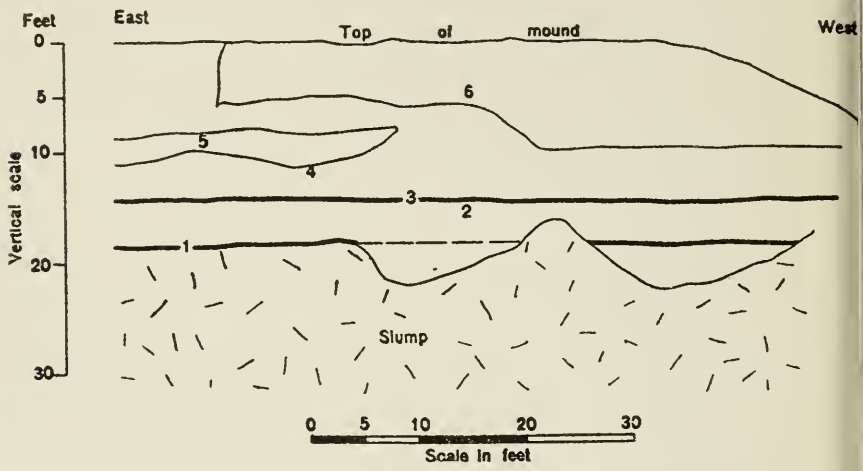


FIG. 13—Diagrammatic sketch showing the arrangement of the materials in the Albert Kunnemann Mound.

tailed examination revealed the structure to merely simulate stratification, the details are deserving of some attention. The appearance of stratification is due to two thin horizontal layers, 1 and 3 in the diagram, about 4 feet apart, the upper one having a position about 14 feet below the top. Layer No. 1 is a dark sandy silt, No. 3 a black soil-like material. No 3 was clearly not a soil in place, however, for the contact with the underlying materials is sharp. At this horizon a large bowl and a burned "altar" were found by Mr. Moorehead in the course of the excavations. Between these layers is No. 2 which is a sand containing broken shells, the spots being due to dark lumps of inco-

herent sandy silt, which could hardly have been handled by water. Near the east end are oblique black mixed streaks. The sharp irregular contacts of the thin fine layers show that they were not deposited in quiet water but were spread over a level surface, having minute irregularities, by some such agency as man. Horizon (4) is a spotted sand with scattered charcoal, small shells,[1] pottery, bones, and chips of flint. Horizon (5) is a lens in horizon (4) of mixed gray and dark gumbo with charcoal. Its exposed length was about 24 feet, and thickness 2 to 3 feet. Horizon (6) is a mixed dark and gray gumbo-like material showing no stratification. The top of the mound is now flat but it is reported to have originally been some 15 feet higher and to have consummated in a point, the removed material having been scattered over the adjoining fields.

The materials of this mound in their lack of assortment, absence of water stratification, presence of man-made features, mixed materials, and scattering of artifacts are against the natural theory of origin and strongly favor the artificial theory.

THE SAM CHUCALLO MOUND

The Sam Chucallo Mound is situated about 3 miles southwest of Monks Mound and ¼ mile north of Lansdowne Heights at the brink of an old channel.

It is about 100 feet in diameter and 10 to 12 feet high above the surface to the east.

As the result of digging an east-west trench through the mound, 8 feet deep at the maximum, and 40 feet long, it was possible to examine the materials to advantage. The north face of the trench showed a structure as in figure 14. Most of the material is Formation 2, a dark silty clay, the color apparently being due to humus, and mixed in the silty clay are irregular lumps and streaks of gray to dark gumbo which show minute rusty, ramifying canals and

[1]The following were identified by Curator F. C. Baker: Gastropods: *Physa gyrina* Say (a common fresh-water shell living in summer-dry ponds), *Vivipara contectoides* W. G. B. (fragments); Pelecypod; *Anodonta grandis* Say (fragment); miscellaneous: shell head of marine conch *(Busycon)*, vertebra of small fish.

imprints of rootlets. The rootlets are almost gone, but such as are found are in these minute canals. Apparently the oxidation of ferrous compounds was favored along these minute canals by the ready access of oxidating ground water. Intimately mixed with the gumbo is some fine sand.

At the base of this motley arrangement of materials is Formation 1, a yellow to grayish-yellow fine sand, the contact being nearly level for most of the distance but sloping and passing beneath the trench at the east and west ends.

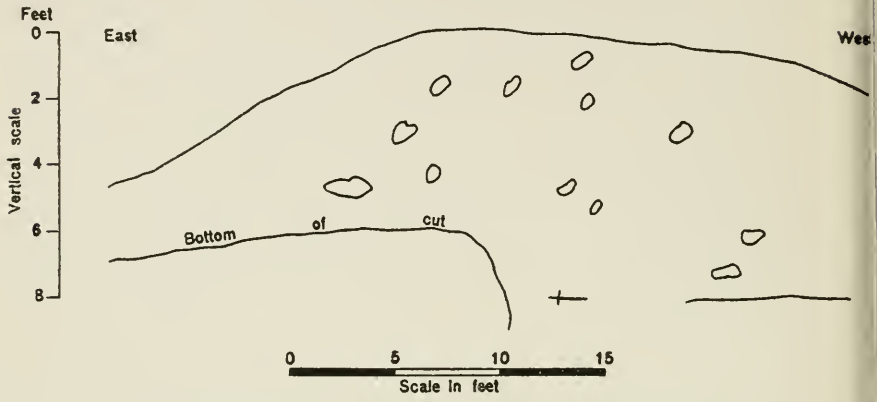


FIG. 14—Diagrammatic sketch of the structure of the materials in the north face of the trench, Sam Chucallo Mound.

Mixed with this sand in heterogeneous fashion are lumps of black soil, and the sand itself is a mixture of calcareous and non-calcareous materials. It contains snail shells,[1] some in fragments, some soft, and some mashed. All of the aspects of this sand layer are unlike those of deposits made by natural agencies and like those made by man.

The south face shows the same sequence and mixing, but the sand layer, No. 1, at the bottom is a little lower than in the north face, and near the center the sand layer is interrupted sharply by gumbo and black silty clay. (See

[1]The following species were identified by Curator F. C. Baker: Gastropods: *Planorbis trivolvis* Say, *Lymnaea palustris* (Müller). *Segmentina armigera* (Say). *Helicodiscus parallelus* (Say). The first three snails live in small ponds which may become wholly or partially dry in summer; the fourth one is a land snail living near water.

Figure 15.) A human skeleton was found just below, at about 8 feet below the summit of the mound. Clearly, after the sand was accumulated there by man, the sand was cut into for burial purposes, and it appears that the overlying material was brought there and dumped, thereby increasing the height of the mound.

THE SAWMILL MOUND, No. 39

A low mound about 1000 feet northwest of Monks Mound, on the south side of Cahokia Creek, was opened for a depth

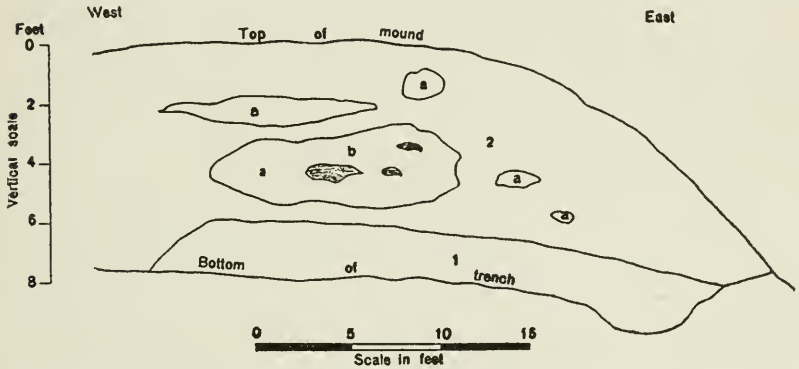


FIG. 15—Diagrammatic sketch of the structure of the materials in the south face of the trench, Sam Chicalo Mound.

somewhat below the ground-water level for wet seasons. About 13 feet was exposed. The upper 3 to 5 feet consist of gumbo material with a few small fragments of charcoal and pottery, and lumps of yellow sandy silt. Below this are yellowish stratified sandy silts, the layers having very irregular contacts, dipping to the east, and showing lumps of dark incoherent silt up to 1½ inches. The materials are somewhat calcareous in spots, but at no particular horizon. The arrangement of the materials has every aspect of being due to human dumping.

AUGER BORINGS ON MONKS MOUND

The size of Monks Mound forbade any extensive exploratory work and hence no decisive evidence was obtained

regarding its constitution. Its artificial form, however, invited some investigation to determine the trend of the evidence, and altho it is realized that borings are not conclusive, yet it was felt that they would show something. Three borings were made on the summit and two on the east slope, by means of an auger 1¼ inches in diameter, attached to sections which permitted penetration to a depth of 17½ feet. By digging pits 3 feet deep, the total depth penetrated on the summit was 20½ feet. Samples were laid out in succession and carefully examined and described.

Boring No. 1.—A pit 3 feet deep was dug on the summit near the north end, which showed black soil with charcoal and fragments of pottery at the bottom. The boring was started in the bottom of this pit, and the following materials were revealed:

	Thickness Feet
3. Sandy silt, dark, with 1 to 2 inch streaks of fine sand, light gray in color, some of the dark shows mixing with the light,[1] resembling the exposed materials in the smaller mounds	8
Changes to	
2. Fine sand, dirty buff, loose; a little ochre-sand	3
1. Grayish yellow sand, showing a little admixture of dark silt and some thin streaks of light ochre sand, strongly effervescent at 17 feet but not effervescent at the bottom except in spots	6½

Boring No. 2.—About 50 feet south of Boring No. 1 a pit 3 feet deep was dug, all of it being in black soil which contained a few pieces of charcoal. The boring in the bottom of this showed:

	Thickness Feet
6. Fine sandy silt, dirty gray, non-calcareous	9
5. Black clay with a thin streak of fine sand, a piece of charcoal at a depth of 13½ feet from the surface	2
4. Fine sand, somewhat silty, moderately calcareous	4
3. Dark sandy silt, ochre pellets	¼
2. Fine sand, silty	½
1. Dark clay, like gumbo, with streaks of fine sand	1¾

[1]The writer satisfied himself after careful inspection that the mixing was not due to the auger. The relationships of the materials are markedly similar to those found in the exposed mounds.

Boring No. 3.—This boring was made in the bottom of a pit 3 feet deep, about 50 feet south of Boring No. 2, the pit showing dark soil with small chips of brick in the top and charcoal fragments below, changing to dirty silty sand in the bottom. The boring revealed:

	Thickness Feet
3. Fine silty sand, some pellets of limonite and rusty streaks, some trace of charcoal and some evidence of mixing, slightly calcareous at the base	10½
2. Intermixture of dark clay and fine yellow sand, a fragment of charcoal ½ inch in length about 16 feet below the original surface, non-calcareous	5
1. Dark clay, like gumbo; trace of charcoal at depth of 19 feet below the original surface, non-calcareous	2

The dark clay and the mixture of materials are similar to that seen in the various human mounds previously described. The presence of charcoal in the lower part of the section as well as in the upper is also indicative that this material has had human associations.

Boring No. 4.—On the east slope due east of Boring No. 1, a pit was dug to a level of 16 feet below the top of the mound at Boring No. 1, and the back edge of the pit was cut back about 4½ feet horizontally from the slope, developing a vertical face 4 feet high. The back face showed a mixture of materials, but whether or not they were in place could not be definitely ascertained. A boring was put down about 3 feet from the natural slope, which showed:

	Thickness Feet
2. Mottled gray and ochre and grayish yellow and black silt, calcareous in spots at a depth of 1 to 3 feet from the top of the boring, non-calcareous below	12½
1. Black, tenacious, humus clay, like gumbo, with some suggestion of a gray mixture, non-calcareous	5

The mixture of materials, the rather anomalous relation of non-calcareous beneath calcareous without the usual additional evidence of an interval of weathering, and the gumbo-like clay at the base, are indicative of a human mode of origin. The end of the auger reached a level 33½ feet below the top of the mound. It is of course not possi-

ble, without trenching or tunneling, to demonstrate that these materials pass into the mound. Even tho the upper part of the boring may be in slump material, the lower part is believed to be deep enough to pass through the slump.

Boring No. 5.—A pit was dug 11 feet lower vertically than the preceding, or 27 feet below the summit of the mound, and a boring was made 3 feet from the outer edge and 3 feet vertically below the slope. The materials found by boring were 16 feet of blue-black clay with thin layers of light gray and ochre-mottled clay, all non-calcareous and without pebbles.

Statement of Conclusions.—Such chance as these borings afford for ascertaining the nature and arrangement of the materials, indicates that they are man-laid. They are at least in line with the evidence offered years ago from the dug well on the west side of the mound and described by Flagg. (See page 64.) Repeating a previous remark, these borings, while made carefully, cannot be regarded as the equivalent in scientific value of open trenches, but it is to be noted that the results are consistent with the artificial form of the mound.

COMPARISON WITH THE MATERIALS OF THE EAST VALLEY BLUFF

Inasmuch as it has been asserted that the materials of the mounds are similar to the materials of the valley bluffs, the writer made a careful examination of the excellent road-cut exposures recently made along the National Highway where it ascends the bluffs directly east of Monks Mound. The deepest cut is at least 25 feet deep and reveals only loess from the foot of the bluff to the top. Judging from the adjacent localities, the loess is a thick mantle concealing the underlying glacial drift and bed-rock, the present grade of the road nowhere being down to the level of the underlying materials.

The loess is loose and friable, floury, gritty, and easily blown. It contains a rather prolific mollusca fauna, the

following having been collected, the large species occurring mostly in the lower part:

Polygyra appressa (Say)	*Pupoides marginatus* (Say)
Pyramidula alternata (Say)	*Succinea retusa* Lea
Pyramidula shimekii (Pilsbry)	*Succinea vermeta* Say
Gastrocopta contracta (Say)	*Helicina occulta* Say

From a grayish color in the lower part, the loess grades through yellowish and buff to brownish in the upper part. In places it presents a slight pinkish cast. On the slope it is rarely leached of calcium carbonate more than 4 or 5 feet, and generally less, but below this leached zone it is highly calcareous. Save for a few places where there is a semblance of bedding, stratification is generally lacking. Some sub-spherical concretions are scattered through it, and along horizontal or gently inclined fracture planes there is a limy concentration, the product of the dissolving action of ground water above and precipitation below.

In all of the cuts, there was no such mixture of materials as occur in the excavated mounds; no sign of human disturbance; no content of human implements, flint chips, sea shells, pottery, charcoal fragments, specimens of travertine, burned horizons, bones of animals nor any other evidence of human activity; no content of gumbo lenses or balls or irregular masses; no promiscuous mixing of calcareous and non-calcareous materials. In short, there is no possibility whatsoever of correlating the materials of the bluffs with the layers of the mounds. Some loess may have been secured from the bluff and used with various materials of the Mississippi flood-plain in the building of the mounds, thus accounting for some of the loess fossils reported from the mounds, but the quantity of such material found in the mounds is very small.

In the mouth of Canteen Creek Valley, are terrace remnants with a summit reaching the 480-foot level on the point of a spur where an Indian Mound, 20 feet or more in height, is situated. Many flint chips occur in the soil but no exposure of old alluvial materials could be found. A gulley wash on the south side exposes 7 to 8 feet of fossiliferous buff loess. The terrace has a maximum width of

about 300 yards. About ¼ mile farther up the valley is another terrace remnant. On the south side of the creek a 35-foot exposure in the valley wall shows only loess, yellowish in color, with a mottling of gray and buff. Another road-cut, 20 to 25 feet deep, on the north side of Schoenberger Creek, near the interurban tracks, exposes only loess. A new highway cut at Edgemont just north of the cross-roads shows reddish loess with large, sub-spiral snail shells, beneath buff loess.

About one mile southwest of Caseyville, the Pennsylvanian strata make up a considerable portion of the bluff.

SUMMARY OF THE EVIDENCE AND CONCLUSIONS

The present study of the external characteristics and geological setting of the mounds, and of the exposures made in four of them, has yielded the following lines of evidence bearing upon their mode of origin:

1. The summit area of all of the mounds is so limited that this fact alone minimizes the force of the suggestion that they are terrace remnants of a former higher filling of the Mississippi River Valley.

2. Their pyramidal, oval, and circular shapes are not in keeping with the usual irregular outlines of erosion remnants and this, together with their steep uniform slopes, carries the aspect of an artificial mode of origin. They are clearly not sand dunes, kames, eskers, or natural, constructional forms of any sort.

3. The dominant orientation of the elongate mounds with the cardinal points of the compass, and the striking alignment of many of the mounds, are difficult to explain on the basis of the natural theory, and point strongly to their being man-arranged and man-made.

4. The absence of meander scars on the slopes of the mounds or at their base is out of harmony with the idea that they are terrace remnants.

5. A critical consideration of the history of the alluvial filling of the Mississippi River Valley and of the behavior and capacity for work of that master stream, together with the evidences of its great activity and shifting, makes it appear doubtful if any of the original fill is present in the valley, altho such a possibility can hardly be precluded. According to this view, the glacial filling was probably removed by the voluminous waters of Lake Chicago, Lake Duluth, and Lake Agassiz, and the present filling is the result of the "scour and fill" and "cut and fill" processes of the present shifting and oscillatory stream.

6. If the mounds are terrace remnants of a former higher filling, the materials of which they are composed

should show the stratification and assortment of that type of filling. If the filling was glacial till, the materials should be of that character; if eolian, they should be limited in texture to that size which wind can carry; if lacustrine, they should be characteristic of quiet water deposition except near the shore line; if fluvial they should show the texture and structure of materials deposited by running water. The materials of all four mounds examined do not show the characteristics of any of these physiographic agencies. They are stratiform but not stratified; they are mainly of fine materials—silts, fine sands and gumbo—but unassorted, lumps and masses of one kind being intercalated with materials of another kind, and bones, artifacts, flints, travertine fragments, charcoal and pottery being scattered throughout without any suggestion of a mechanical separation or orientation; the contacts of the layers are minutely jagged and not smooth; calcareous materials are mixed heterogenously with non-calcareous materials; salt-water shells from the Gulf of Mexico occur indiscriminately with local fresh-water shells; burned layers occur at various horizons; and a long series of holes with bone refuse in their bottoms was found in one mound. Such mixture, such an arrangement, such a complex association of unusual materials, are characteristic only of man-made mounds.

7. In the mound which was opened down to its base, undisturbed material, characteristic of an old sub-soil zone and similar to natural flood-plain materials was found to underlie the mound. In this case the mound possessed no original nucleus, and if any is present in the other three mounds, which were opened almost to their base, they must be trivial.

In the face of these evidences it is difficult to conclude other than that the mounds which have been thus far exposed are of human origin, and in view of the external features of the others, it seems probable that they are also the product of human activity, the case being less clear for Monks Mound than for any other because of its large size

and the possibility of it possessing a considerable nucleus. But it seems fair to say that its artificial form and the evidence derived from auger borings is consistent with the view that a large part of it at least is the work of the mound-builders. Further exploratory work on these mounds will be observed with interest by both the geologist and archeologist.

ILLUSTRATIONS

PLATE I

FIGS. 1, 2, 3.—Burial pots with skeleton No. 12, Mound No. 20; 2, 3, characteristic Cahokia forms, especially 3. (A363, a, b, c.) Fig. 4—Small pot with skeleton No. 9, a child (A304). Fig. 5—Small crucible-like pot from burned basin, Sawmill Mound (A305). Fig. 6.—Burial pot with skeleton No. 11, Sawmill Mound (A306). (⅔ natural size.)

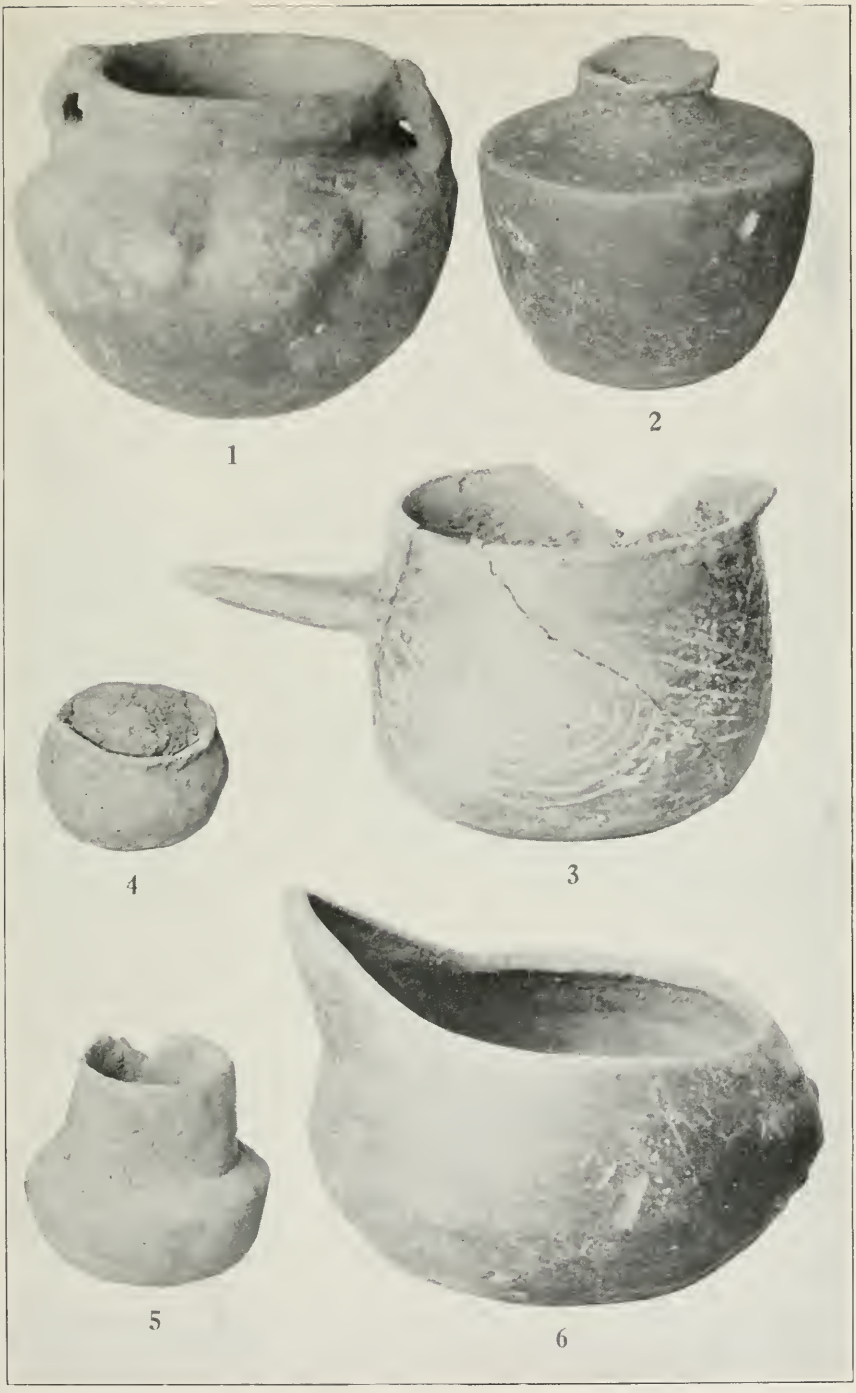


PLATE I

PLATE II

FIG. 1.—A vessel of considerable size, probably a salt pan, Well's-Tippett's Village Site (A355). Figs. 2-4.—Grooved stones of quartzite-like sandstone, possibly sinew stones (A356), Ramey Village Site. Fig. 5.—Grooved stone of quartzite-like sandstone, from burned basin 100 yards south of Sawmill Mound (A357). (About ½ natural size.)

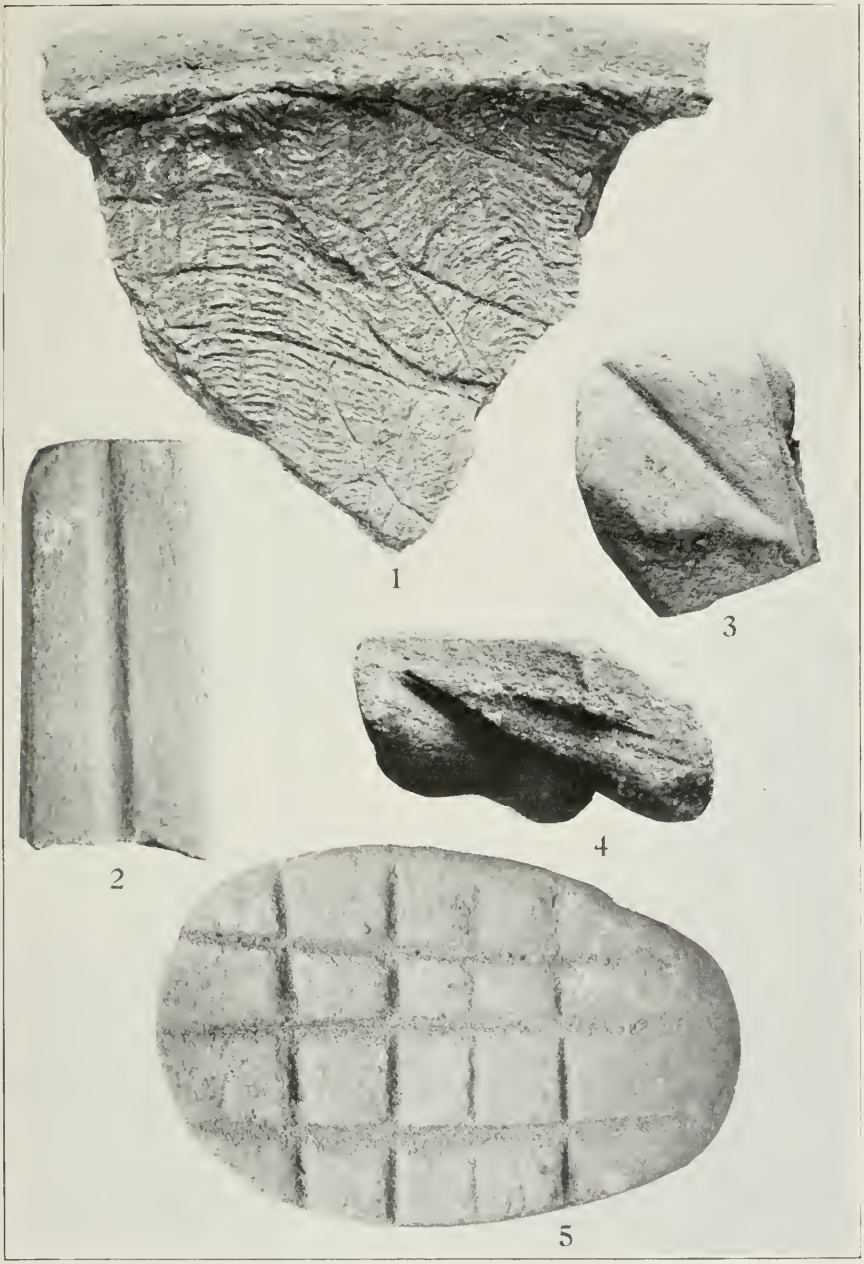


PLATE II

PLATE III

Figs. 1-6.—Types of decorated pottery, Well's-Tippett's Village Site (A313). (¾ natural size.)

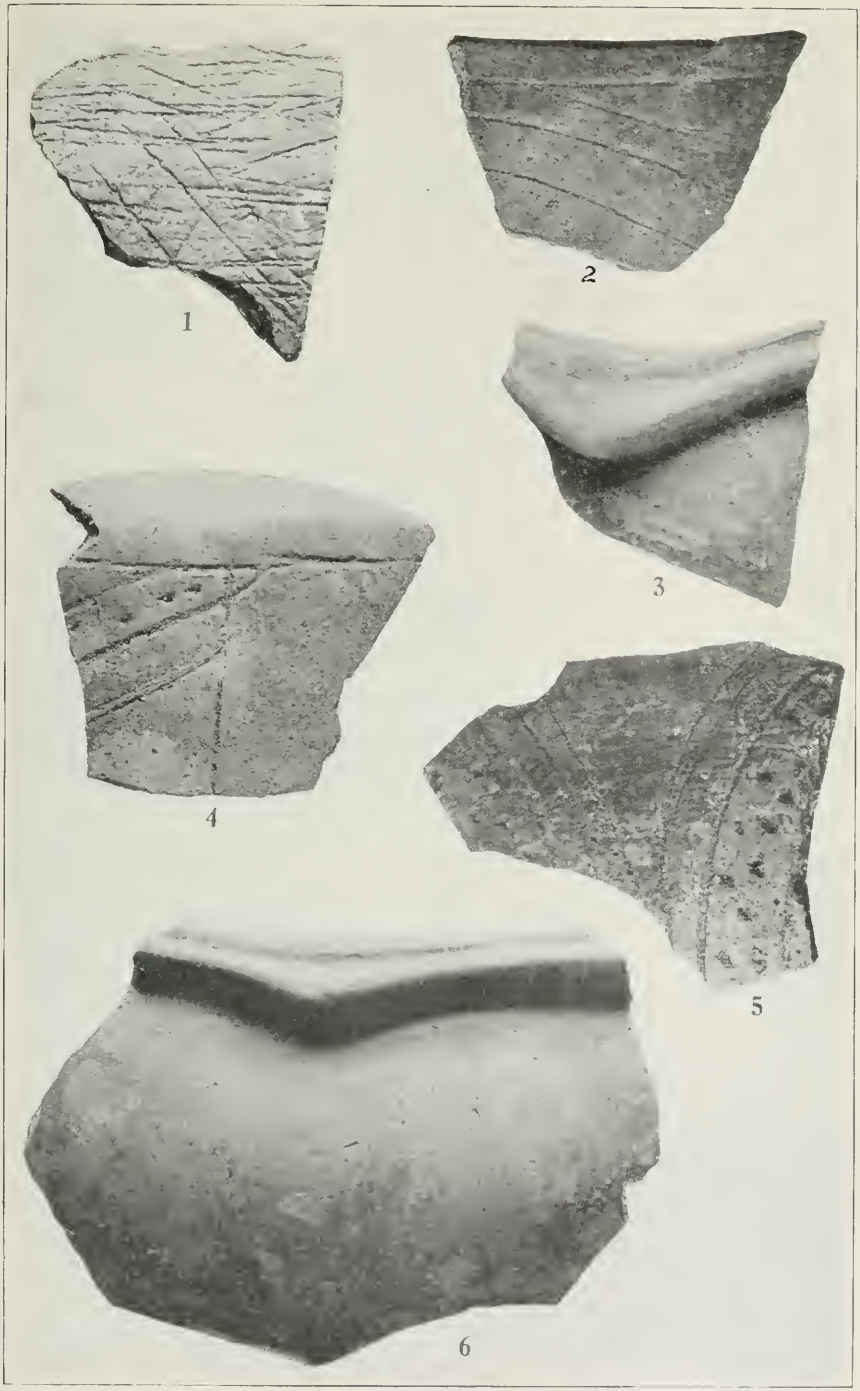


PLATE III

PLATE IV

FIGS. 1-9.—Fragments of pottery, Well's-Tippett's Village Site, 1 to 3½ ft. below surface (A313). Fig. 10.—Peculiarly decorated pottery fragment, Ramey Village Site (A314). Figs. 5, 6 are common Cahokia designs. (¾ natural size.)

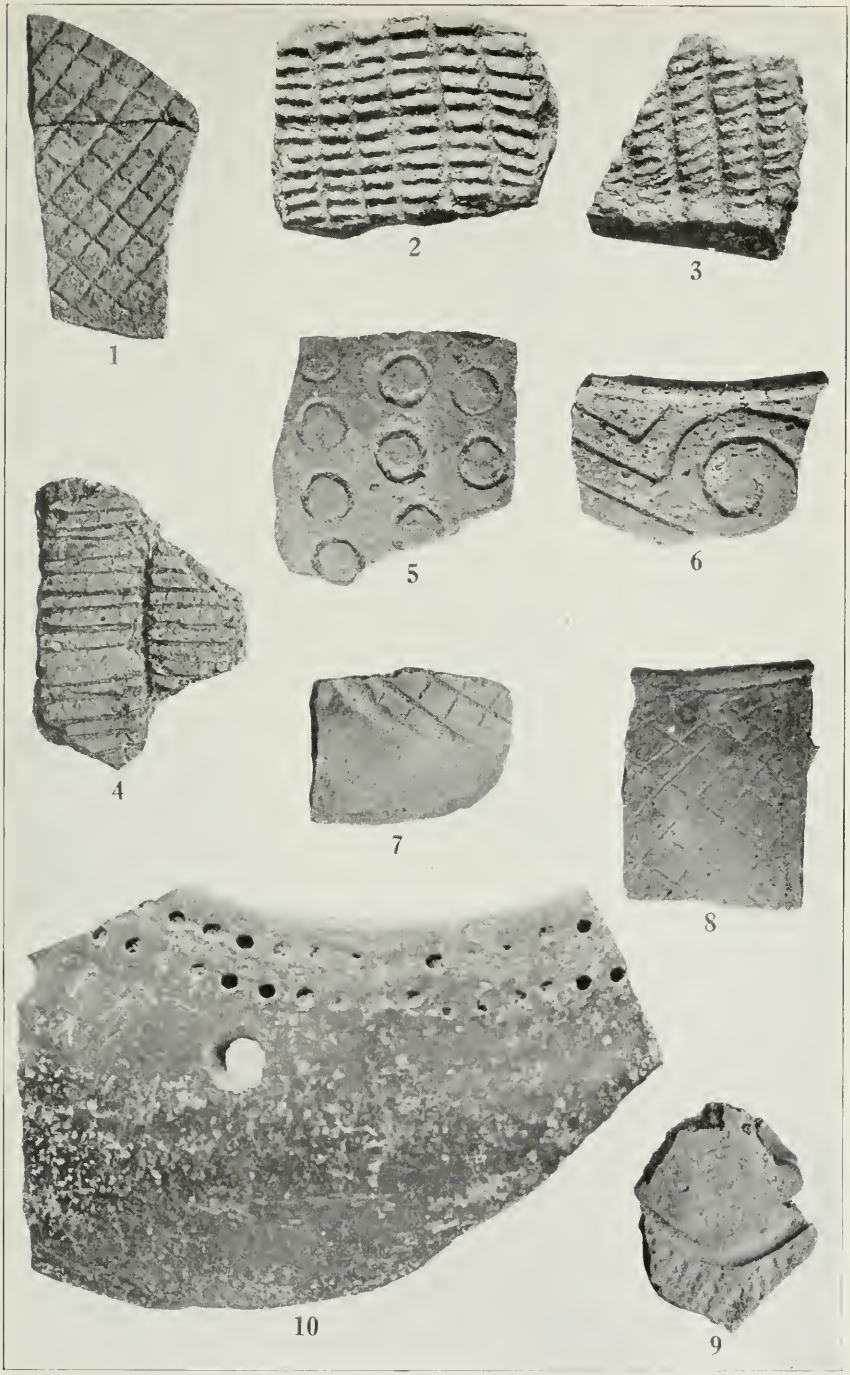


PLATE IV

PLATE V

FIG. 1.—Pottery fragment, James Ramey Mound, depth of 23 feet. (A310). Figs. 2-8.—Ramey Village Site, types of pottery design (A312). (¾ natural size.)

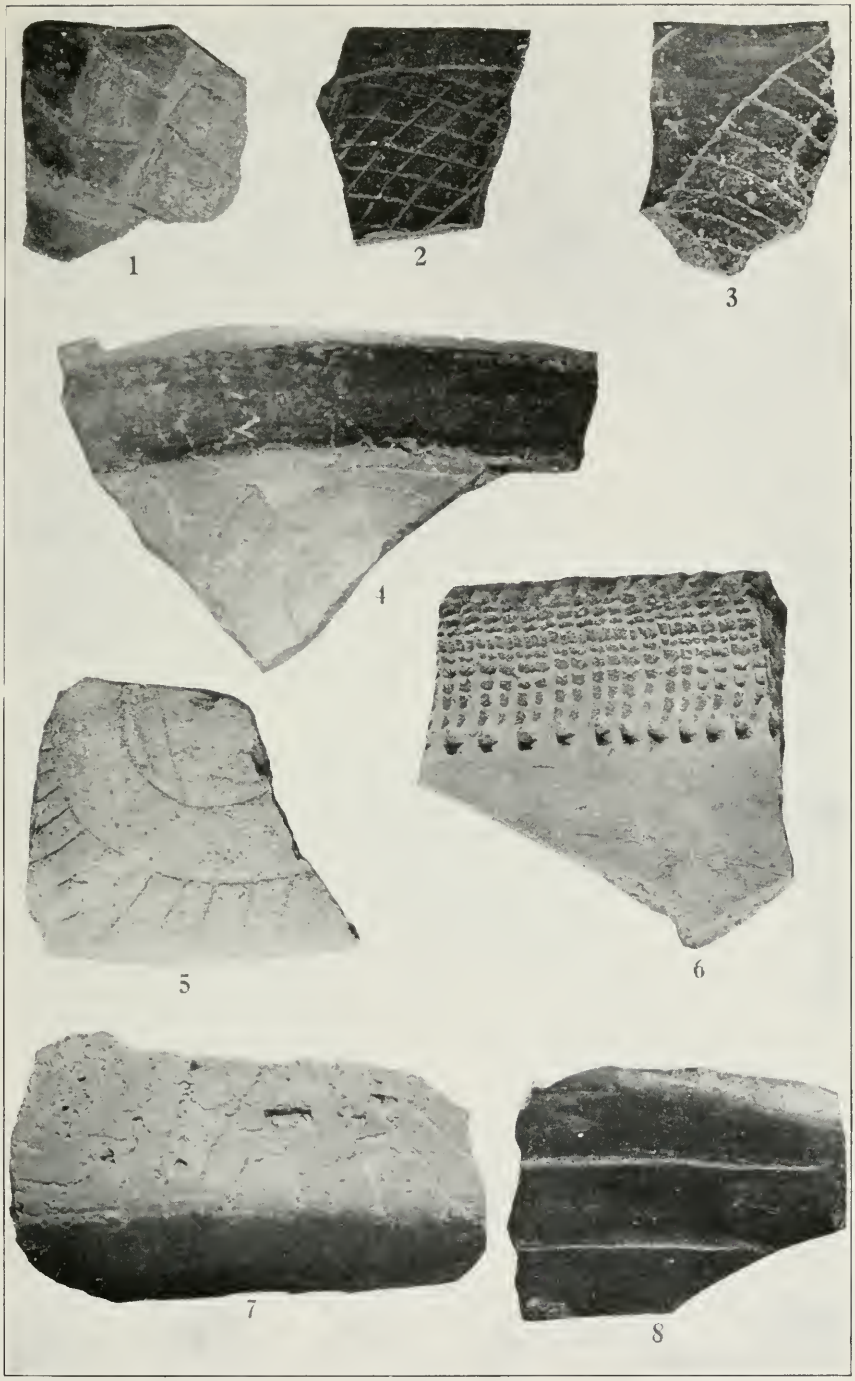


PLATE V

PLATE VI

Decorated pottery from the James Ramey Mound. Figs. 1-3.—Near surface (A307). Fig. 4.—Depth of 19 ft. (A308). Figs. 5, 6.—Depth of 15 ft. (A309). Fig. 7.—Depth of 23 ft. (A310). Fig. 2.—Engraved sandstone (A311). (⅘ natural size.)

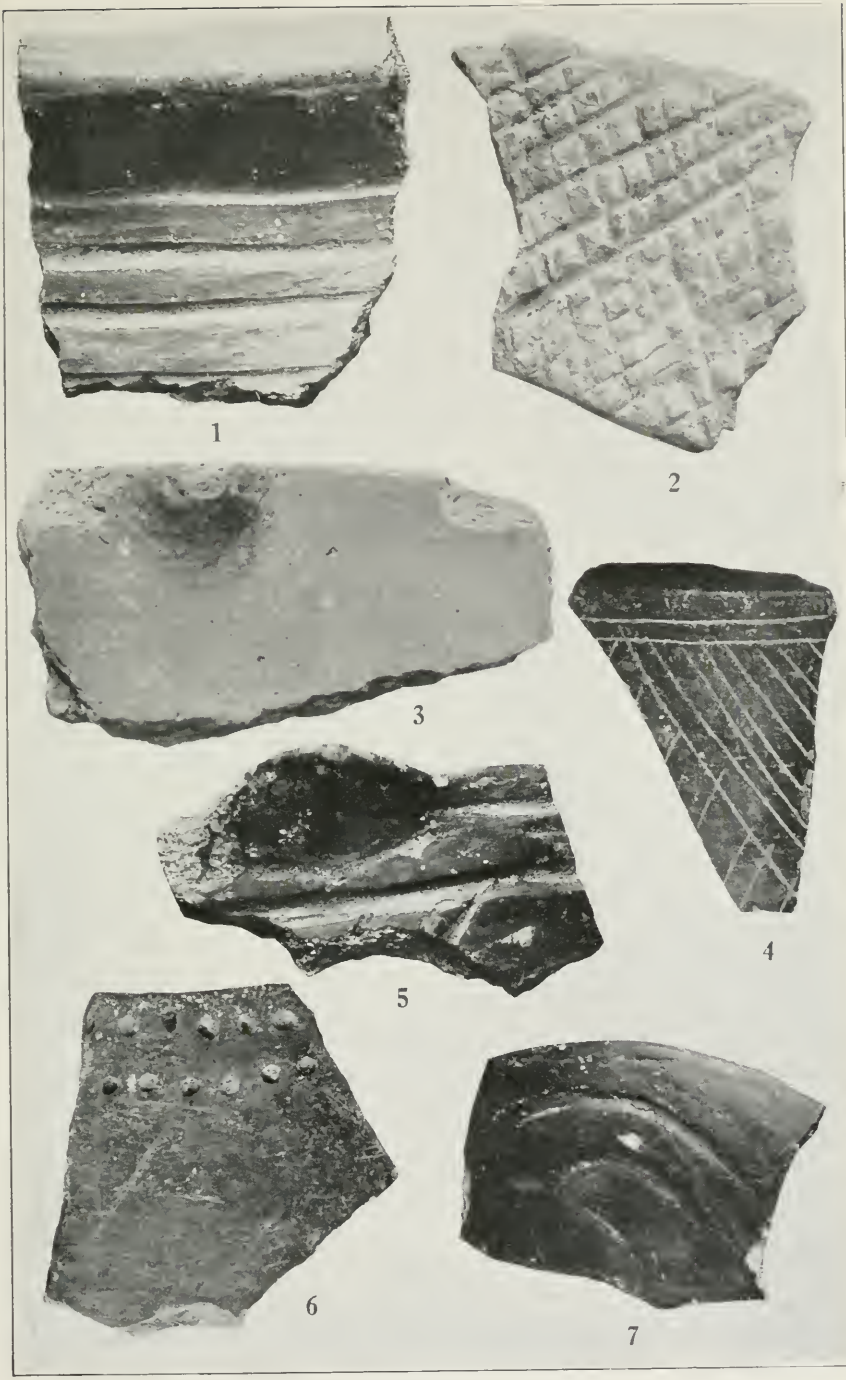


PLATE VI

PLATE VII

Fig. 1.—Shell gorget with skeleton No. 11, Sawmill Mound (A321). Fig. 2.—Shell effigy, Sawmill Mound, made from shell of fresh water mussel (A322). Fig. 3.—Nose or ear ornament made from shell of fresh water mussel *(Elliptio dilatatus)* James Ramey Mound (A323). Fig. 4.—Clay birds-head effigy, Well's-Tippett's Village Site, 3 ft. deep (A324). Figs. 5, 6.—Clay birds-head effigies, James Ramey Mound, 16-23 feet below surface (A325). Fig. 7.—Clay mammal-head effigy, Sawmill Mound (A326). Fig. 8.—Portion of clay pot or ornament (A327). Fig. 9.—Ornament on rim of pot (A328). Figs. 8, 9.—From James Ramey Mound. (¾ natural size.)

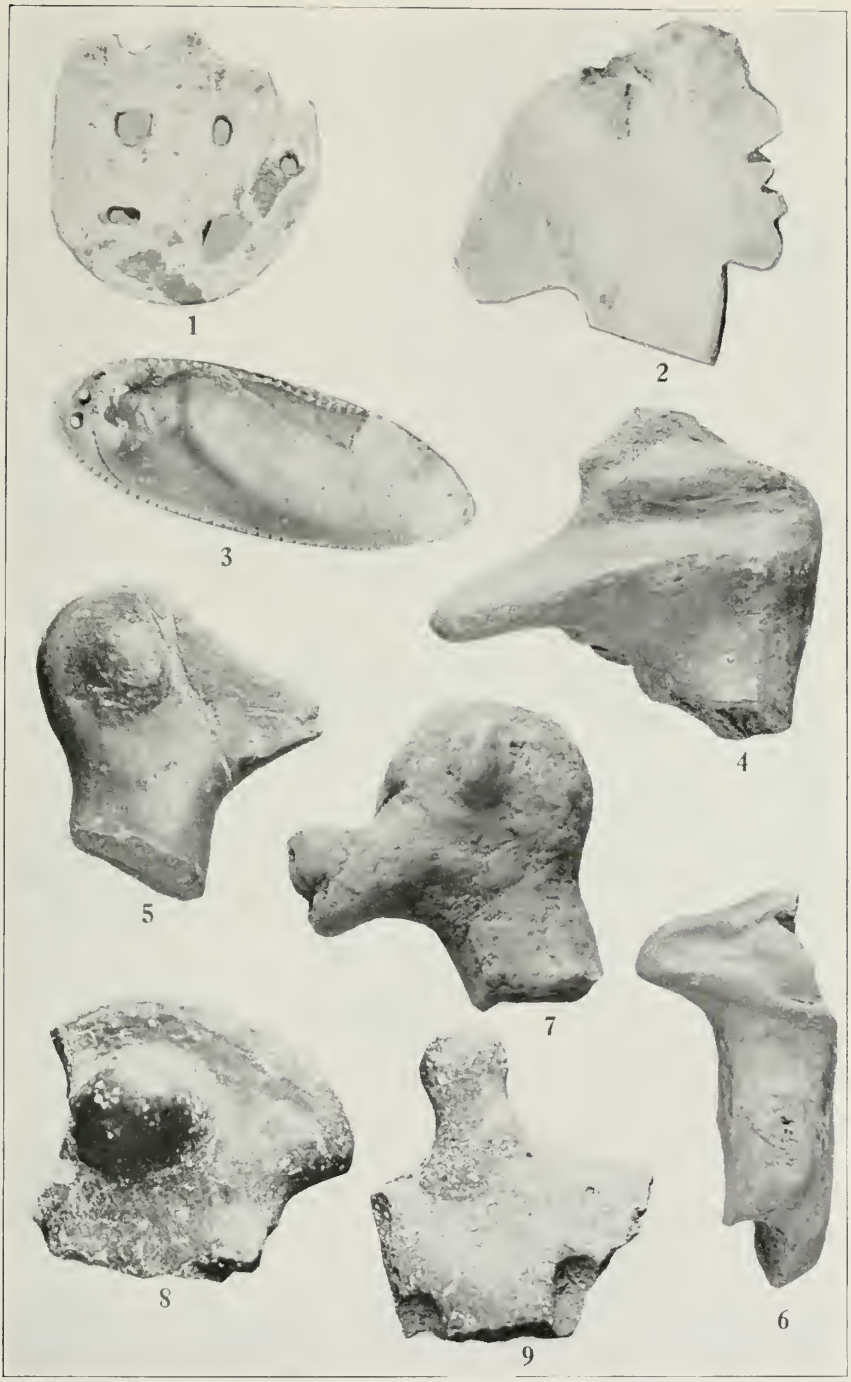


Plate VII

PLATE VIII

FIGS. 2, 4, 9, 12.—Shell beads made from marine conch *(Busycon)* (A329). Figs. 5, 6.—Shell beads made from fresh water mussels (A330). Figs. 1, 11.—Shell ornaments from marine *Busycon* (A331). Figs. 7, 8, 10, 20.—Shell ornaments made from fresh water mussels (A332). Figs. 13, 15, 17.—Shells and central axis of marine conch, *Busycon perversa* (A333). Fig. 16.—Marine conch, *Busycon carica* (A442). Fig. 19.—Ornament made of side of *Busycon* shell (A334). Fig. 14.—Marine shell, *Strombus Pugilis alatus* (A334). Fig. 18.—Marine olive shell, *Oliva litterata* (A336). All from James Ramey Mound, between 8 and 23 feet below surface. (Figs. 1 to 12, about natural size; 13 to 20, about ⅗ natural size.)

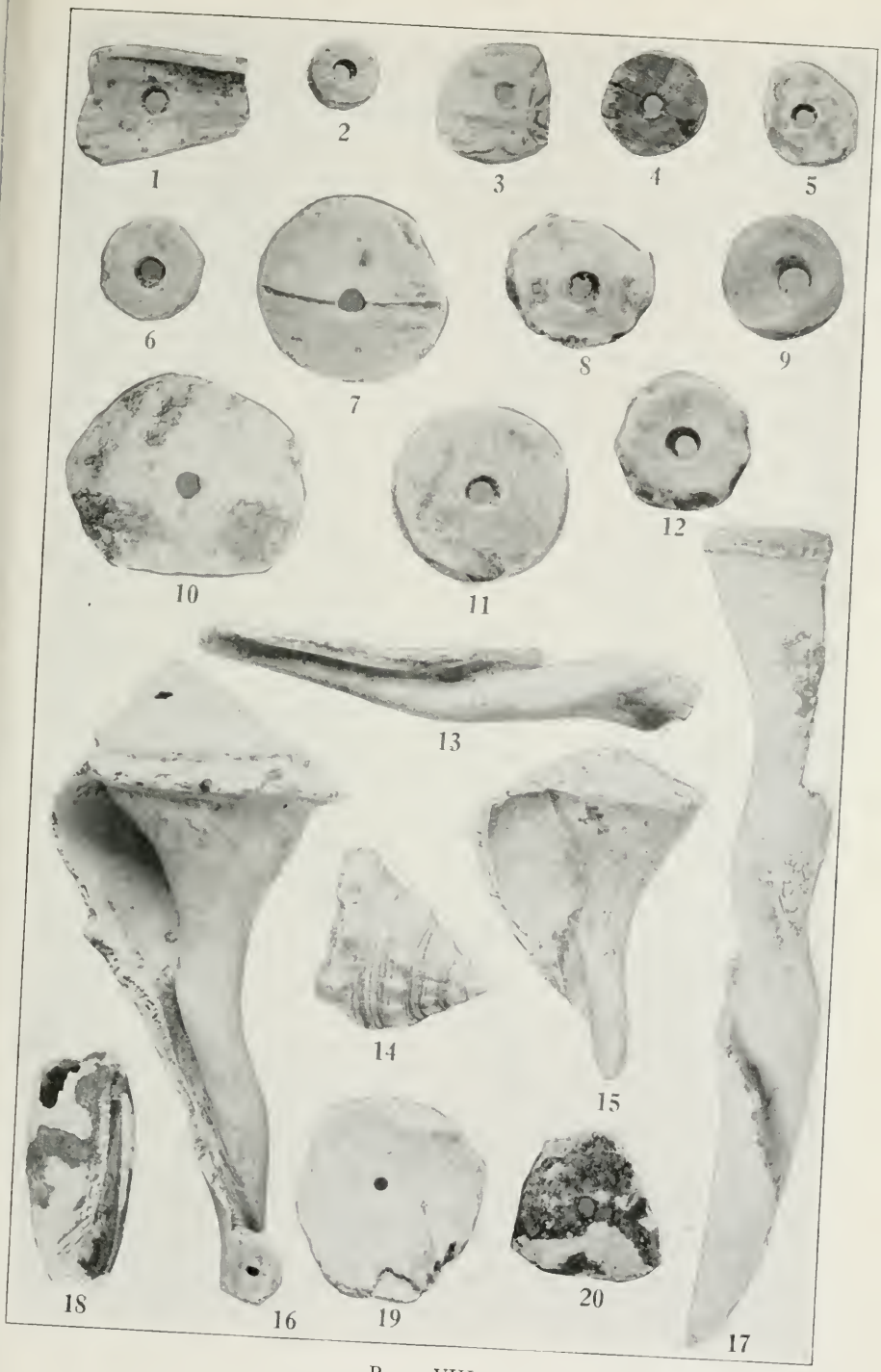


PLATE VIII

PLATE IX

FIGS. 1, 2.—Awl and celt made of deer bone (A337, A338) Well's-Tippett's Village Site. Figs. 3, 7.—Deer bone awls, James Ramey Mound, 8 feet deep (A339). Fig. 4.—Bone awl with skeleton No. 39, Pittsburg Lake (A340). Figs. 5, 6.—Bone awls (A341, A342). From Judge Sullivan's Mound, 10 ft. below surface. Fig. 8.—Bone knife with skeleton No. 11, Sawmill Mound (A343). Fig. 9.—Part of breast bone of Virginia deer, Ramey Village Site (A344). Fig. 10.—Awl made from heel (calcaneous bone) of deer *(Odocoileus virginianus)* found with skeleton No. 18 (mounds 19, 20, 21) (A345). Fig. 11.—Pathologic leg bone of deer, from Ramey Village Site (A346). Fig. 12.—Foot bone of Wapiti with deeply incised lines, James Ramey Mound (A347). Fig. 13.—Lower jaw of Virginia deer used as a chisel or gouge, Sawmill Mound (A348). (About ⅔ natural size.)

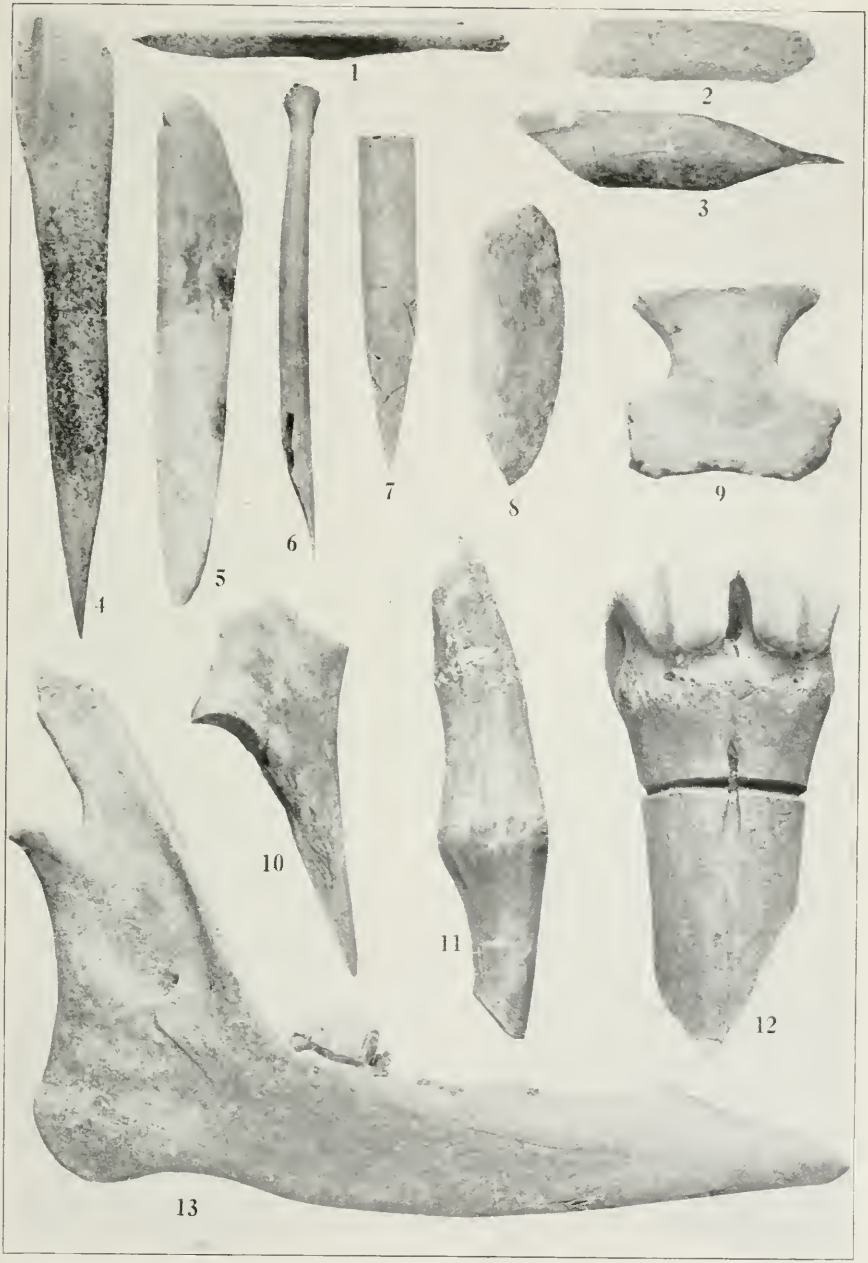


PLATE IX

PLATE X

Fig. 1.—Flint or chert knife of fine workmanship: James Ramey Mound, 12 feet deep, near stake 125 (A358). Fig. 3.—Shouldered hoe. Figs. 2, 4.—Spades, of flint or chert, from field southwest of Monk's Mound (A359, A360). Fig. 5.—Spade of flint or chert: James Ramey Mound, west side, 17 feet deep (A361). (About ⅓ natural size.)

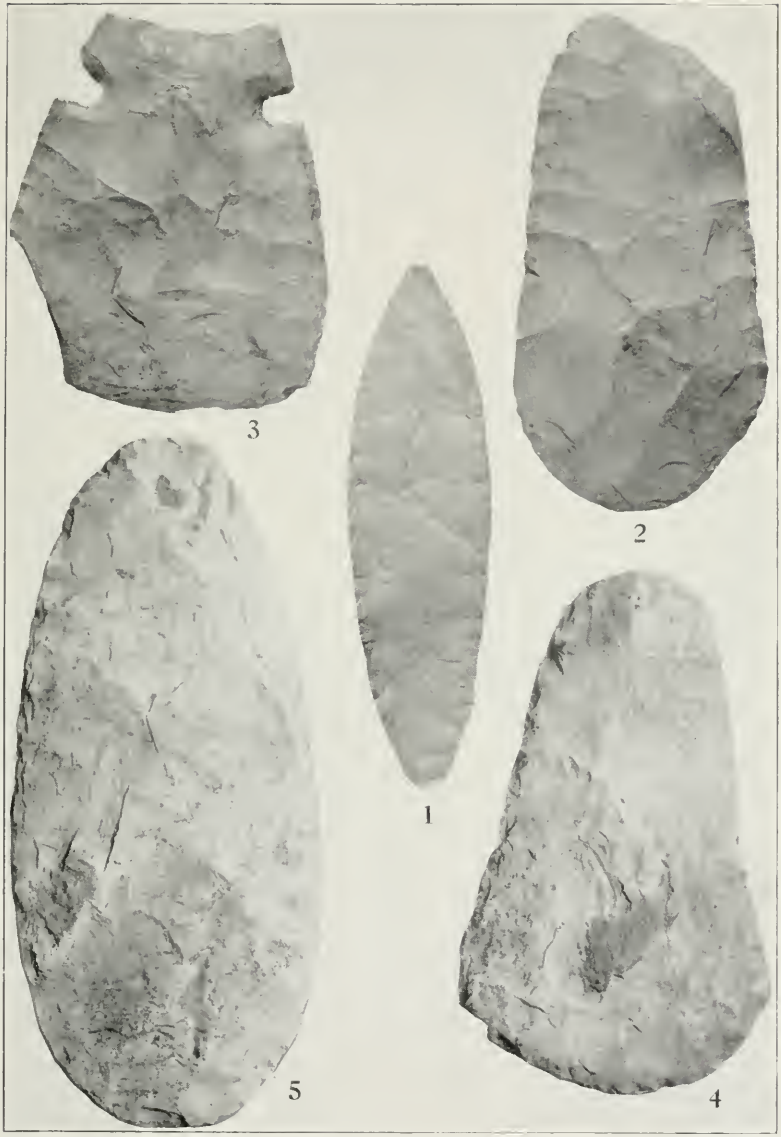


PLATE X

PLATE XI

Pottery disks, perforated and unperforated, are common in the mounds and on the surface. Attention is directed to the peculiar design on Fig. 3. Fragments such as Fig. 1, with a rude circle and cross lines are frequently found. Fig. 1.—Pottery fragment with oval design; Sawmill Mound, 3 feet deep (A315). Fig. 2.—Pottery disc, James Ramey Mound, 15 feet deep (A316). Fig. 3.—Fragment with peculiar design; Stock Yard's Village Site (A317). Fig. 4.—Pottery disc, James Ramey Mound, 12 feet deep (A318). Fig. 5.—Perforated clay disc, Well's-Tippett's Village Site (A319). Fig. 6.—Perforated disc of fine-grained sandstone, Ramey Village Site (A320). (¾ natural size.)

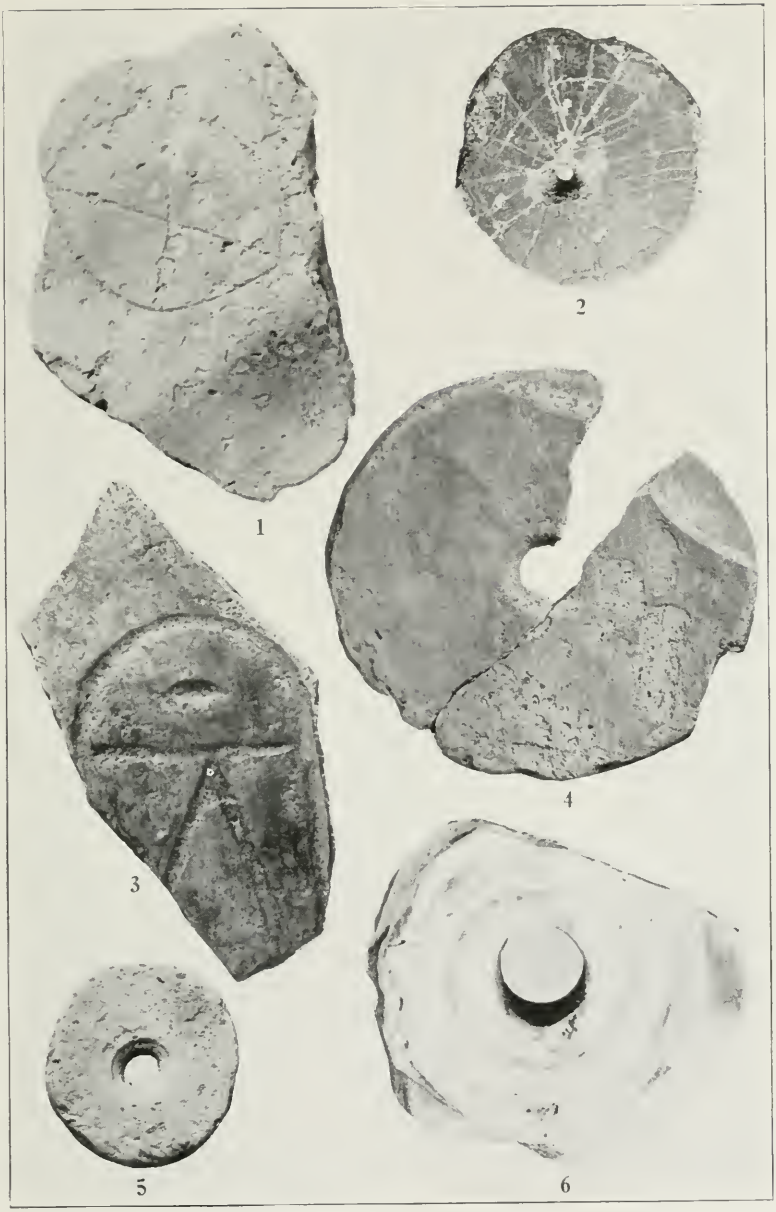


PLATE XI

PLATE XII

Fig. 1.—Flint knife, broken; James Ramey Mound, 8 feet deep (A349). Fig. 2.—Fine-pointed needle of bone, with skeleton No. 30; mounds 19, 20, 21 (A350). Figs. 3-5.—Bone awls, Well's-Tippett's Village Site (A351). Figs. 6-8.—Flint arrow points, James Ramey Mound, 17 feet deep (A352). Figs. 9, 10.—Flint war arrow points, Well's-Tippett's Village Site (A353). Fig. 11.—Flint spear head, James Ramey Mound, 17 feet deep (A354). (Figs. 2-5, ¾ natural size; 1, 6-11, about natural size.)

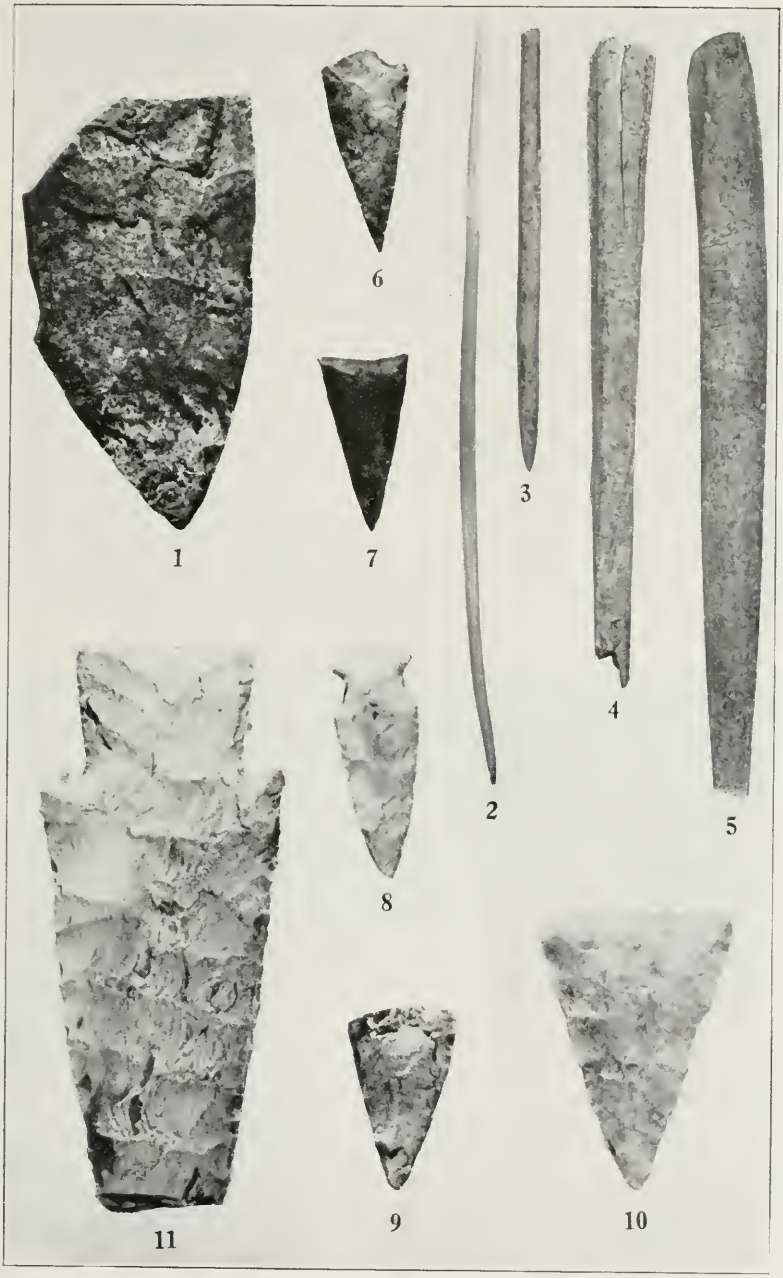


Plate XII

PLATE XIII

Fig. 1.—Digging trench in Sawmill Mound. Fig. 2.—Skeleton No. 11, Sawmill Mound (A302).

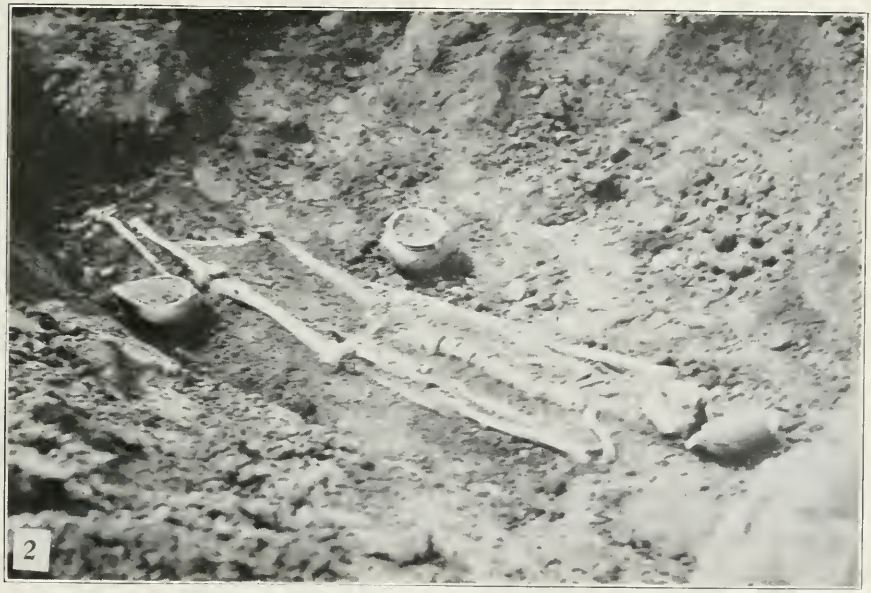


PLATE XIII

PLATE XIV

Fig. 1.—Skeleton No. 12, from Mound No. 20 (A485). Fig. 2.—Circle in James Ramey Mound; also basins and circle of post holes.

PLATE XIV

PLATE XV

Fig. 1.—Trench in James Ramey Mound (No. 33). Note altar in center foreground at trowel. Fig. 2.—Skeletons in position, Mound No. 20. Fig. 3.—General view of circles in James Ramey Mound.

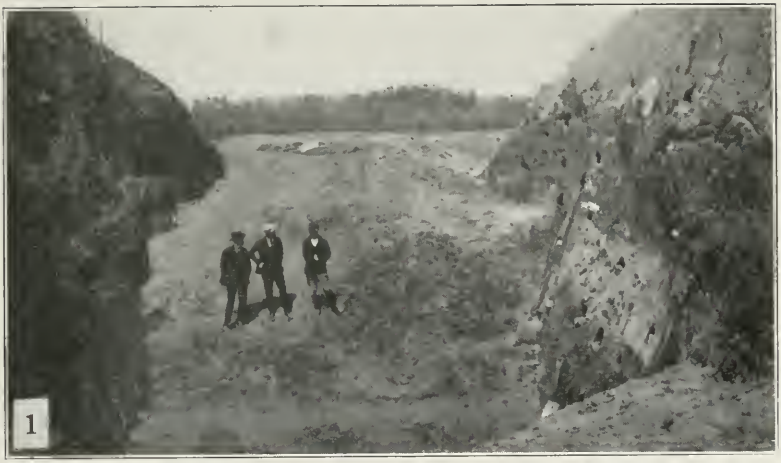


PLATE XV

PLATE XVI

FIG. 1.—Bone awls and needles. Figs. 2-6.—Mussel shells *(Lampsilis ventricosa)*; W. J. Seever coll.: (¼ natural size). Fig. 7.—Hematite axe. Fig. 8.—Grooved axe; Monticello Seminary coll. Fig. 9.—Celt of porphyritic rock, Well's-Tippett's Village Site (A362). (⅓ natural size.)

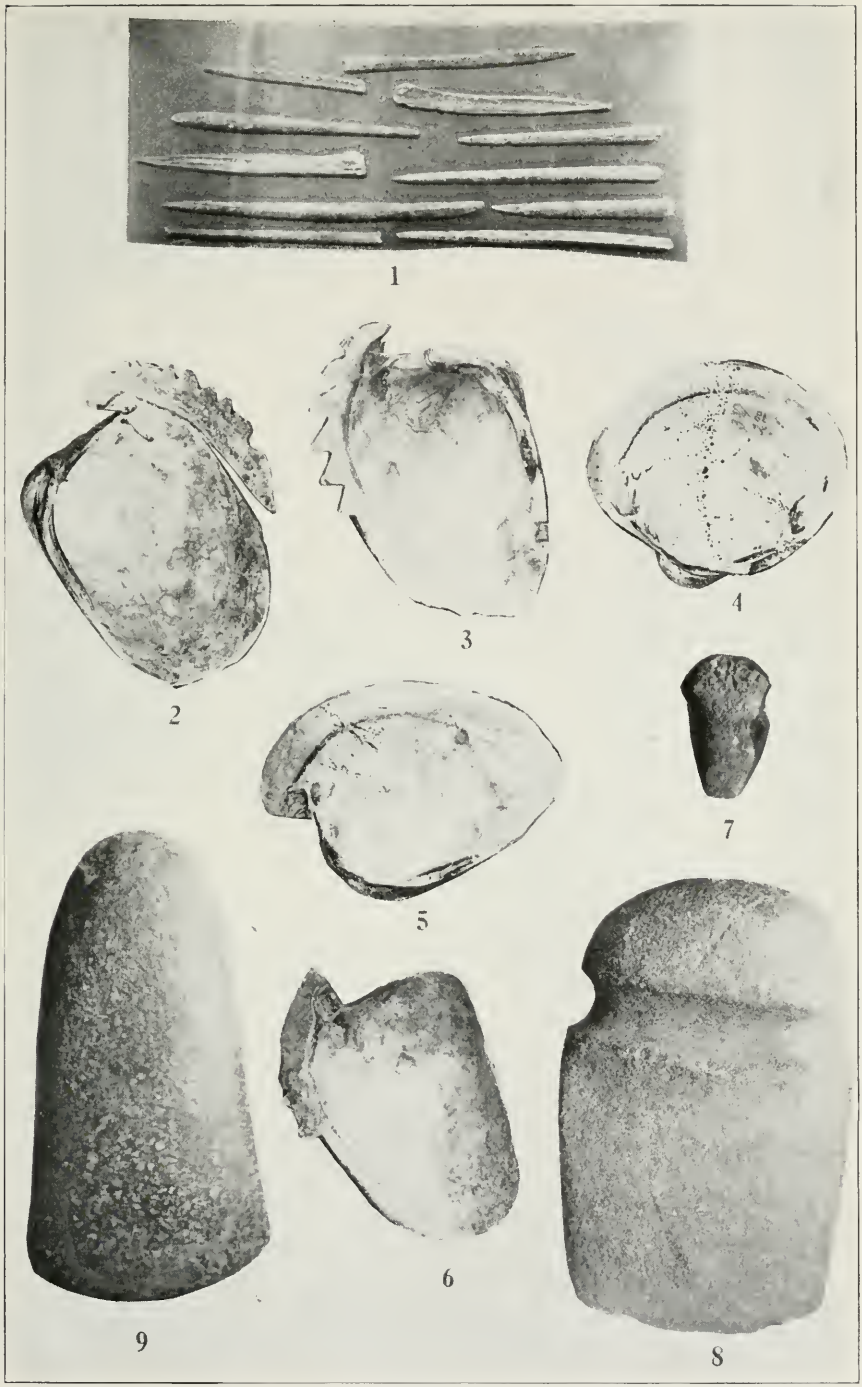


PLATE XVI

PLATE XVII

FIGS. 1-5.—Five pipes, several of them effigies, from the Monticello Seminary Collection. Figs. 6, 7.—Stone effigies; Monticello Seminary Collection. Fig. 8.—Large effigy pipe; W. J. Seever Collection. (See p. 45 for description.)

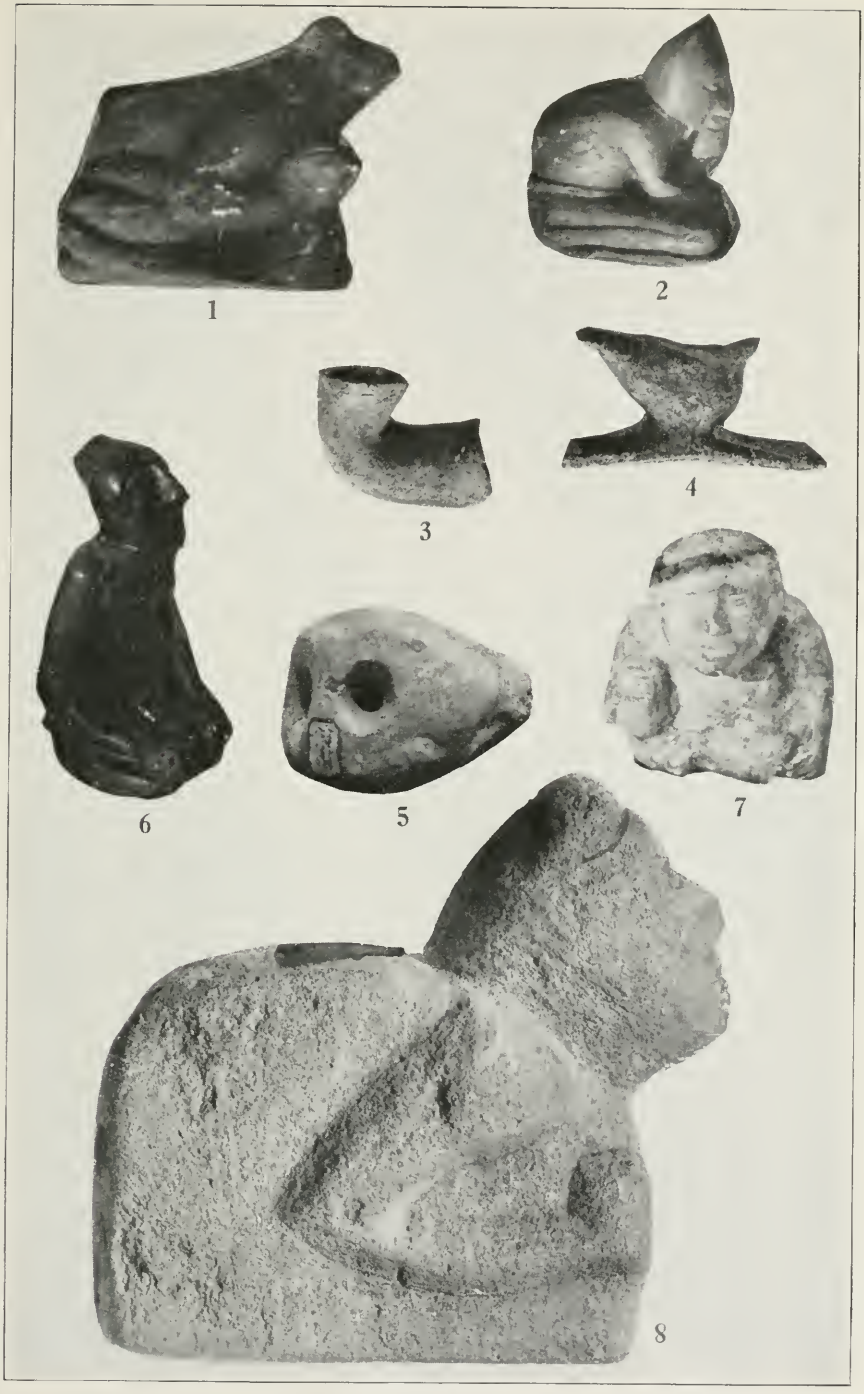


PLATE XVII

PLATE XVIII

Fig. 1.—String of shell beads cut from busycon conch. Fig. 2.—Marine conch shell, *Busycon carica*. Fig. 3.—Marine conch shell, *Busycon perversa*. (¼ natural size.) Monticello Seminary coll. Fig. 4.—Arrowhead of quartz, unusual workmanship. (Natural size.) Found on the surface of Monk's Mound.

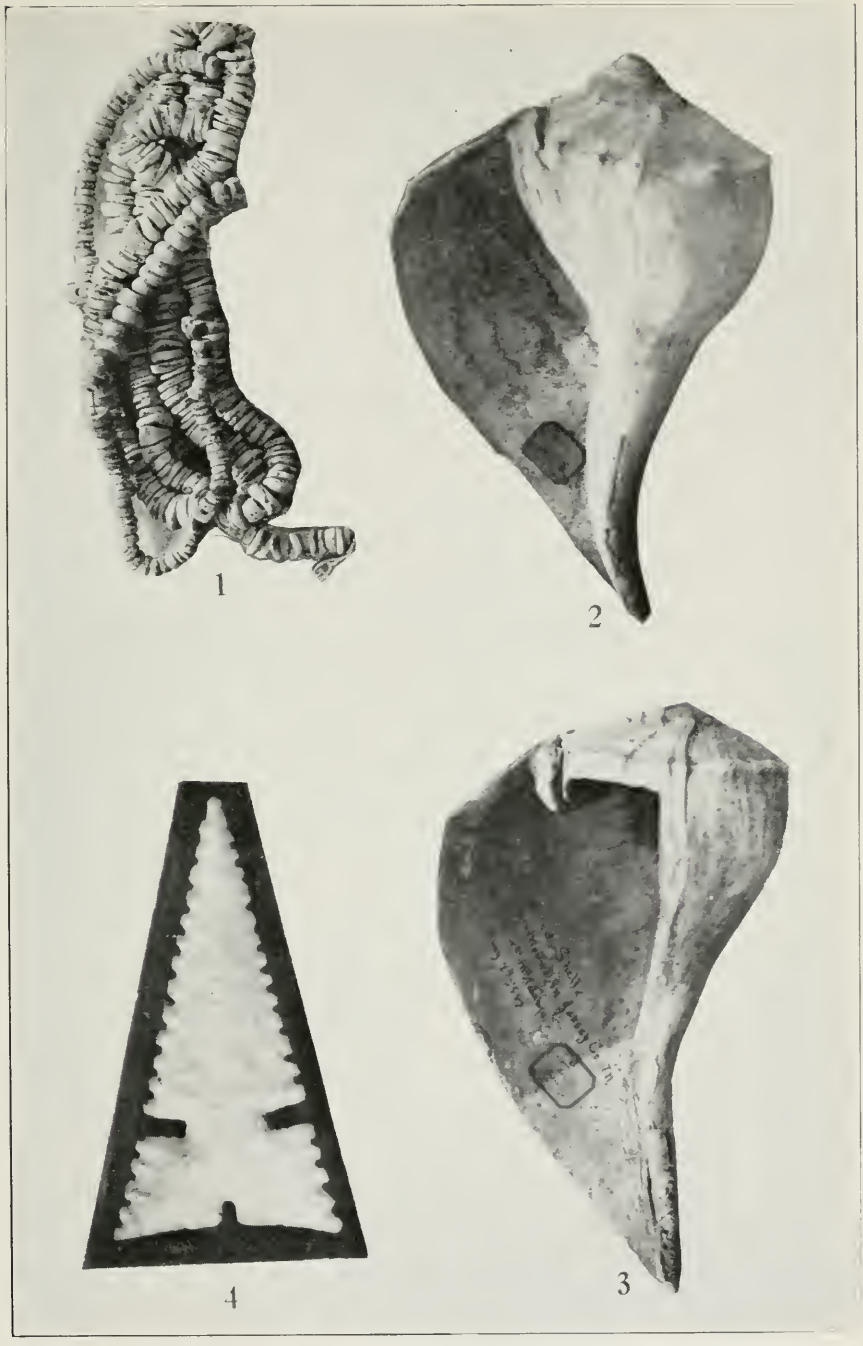


PLATE XVIII

PLATE XIX

View of the Fox Mound and another mound located about three-quarters of a mile south of Monk's Mound. Photograph by Mr. Gordon Servant.

PLATE XIX

PLATE XX

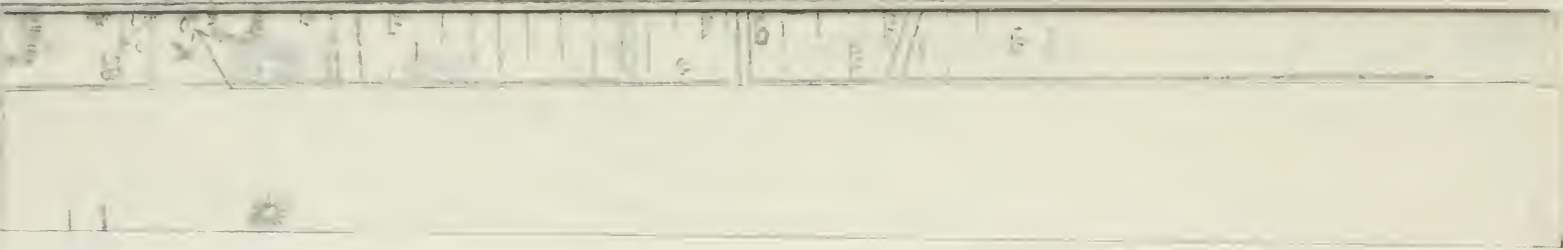
One of the smaller mounds of the group. Photograph by Mr. Gordon Servant.

PLATE XX

PLATE XXI

Monk's Mound viewed from the southeast, showing in the left foreground the terrace or apron. Cut loaned by Smithsonian Institution.

Plate XXI



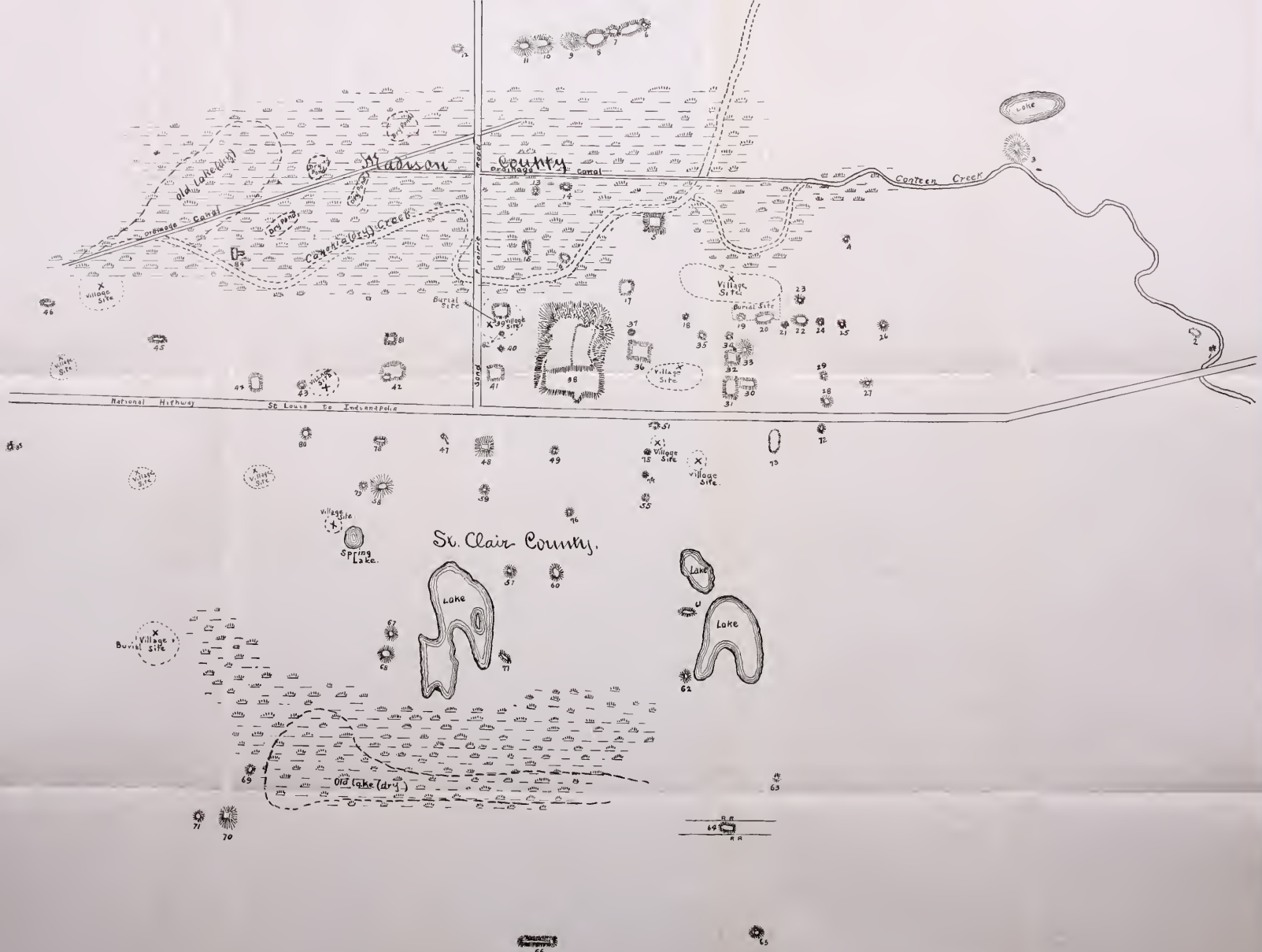


PLATE XXII

Map of Cahokia Mound Group. Based on map of J. J. R. Patrick, 1881. Camp sites and burial sites are indicated, showing result of 1921-22 field work

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